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Technologies of Choice: The shaping of choice on the World Wide Web

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Abstract

Nowadays, choice is a ubiquitous aspect of everyday life. The emergence of the web has contributed to this explosion of choice, providing a seemingly endless landscape of goods and services to choose from. Whilst choice is held to be fundamental to individual freedom, wellbeing and self-identity, we currently have little understanding about how websites shape or govern choice, and what this might mean for individuals and society. This thesis undertakes a foundational examination of how choice is shaped in online spaces with respect to the design features and architecture of websites. Websites, or parts thereof, that are designed to enable users to navigate choice and compare between options to make decisions, are defined in this study as 'Technologies of Choice' (ToC).

In undertaking the study, a phased, mixed methods approach was used. Drawing on several fields of literature, including science and technology studies, Foucaultian social theory, current and emerging social perspectives of choice, and Internet studies, a conceptual framework was developed for examining how choice is constructed and governed on the web. The ToC conceptual framework has four over-arching dimensions: 'Having Choice', 'Facilitating Choice', 'Knowledge Production', and 'Configuring Users'. The conceptual framework was then elaborated through an analysis of websites, resulting in 12 'sub-dimensions' and 56 'features'. The 12 sub-dimensions categorise sets of ToC features that shape choice in particular ways, for example, the 'scale' at which choice is provided or the different 'characteristics of commensurability' that make comparisons possible.

Following this, the resulting conceptual framework was applied as an analytical tool to categorise 500 top-ranking websites, using content analysis. Of these 500 websites, 193 (or 39%) were identified as 'ToC websites'. The features of these 193 websites were analysed using descriptive statistics, multiple correspondence analysis, and hierarchical clustering, in order to determine the scale and patterns of distribution of ToC on the web, including whether there are broader 'types' of ToC that shape choice differently. ToC are found to be widespread on the web, constituting a kind of 'infrastructure of modernity'. Whilst ToC are predominantly observed in the commercial settings of recreational services and personal goods, the thesis shows that they are also found in other contexts, including consumer information, health and social care, and in different countries. Although the choice-making literature focuses on comparisons between 'products', the study finds that ToC more commonly enable comparisons between private services (67% of ToC sites) than private goods (42% of ToC sites). Similarly, choice is not always global: a third of ToC websites scale down the options on offer, for example to a particular brand (e.g. Virgin Media or BMW).

Despite the ubiquity of ToC, the thesis finds diversity in their design. ToC features are not deployed uniformly on the web: some features are widely used (e.g. 'sortable lists' and 'nominal ratings'), some less so (e.g. 'binary ratings' and 'verified accounts / purchases'), and some are often deployed together.

Analysing these patterns reveals two broad types or 'modalities' of ToC, representing two different sets of ToC features that tend to be deployed together: 'Delimited and Objective ToC' and 'Produsing ToC'. These two ToC modalities shape choice differently in terms of epistemology, individualisation and subjectivity, and political economy. The two ToC modalities are productive of two different 'truth games', as they seek to differently define and produce 'legitimate' knowledge about the options that are compared within the website. For 'Produsing ToC' websites, the web space is reactive to, and links up with, the individual characteristics and social capacities of users, whereas 'Delimited and Objective ToC' websites tend to configure users as undifferentiated, anonymous readers. The two ToC modalities are also positioned differently in terms of political economy. 'Delimited and Objective ToC' websites tend to provide carefully curated choice, for example by delimiting the scale of choice whilst providing the feeling of informed and global choice. In contrast, 'Produsing ToC' websites are found to provide a sprawling and 'hyper' landscape of choice that operates in feedback loops between users and website operators, procedures of algorithmic sorting, and global market processes.

This thesis contributes to, and challenges, contemporary understandings of 'choice' in a web-mediated world. Theoretically and empirically, this study shows how seemingly mundane web-based technologies have a powerful and large-scale role in shaping individual and social realities: on the web, what appears as 'free' choice is highly shaped and governed. This study contributes a novel conceptual framework to the literature, providing a kind of 'grammar' to describe and analyse how choice is constructed on the web. Methodologically, the study makes a contribution to computational sociology, building theory by posing part of the analysis as a 'data mining' problem and using a novel application of statistical methods. Overall, the study charts new conceptual and empirical territory. It challenges the reader to think differently about the entangled trajectories of choice, technology, and consumerism.

Declaration by author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

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Publications during candidature

Peer reviewed papers

Gillingham, P. & Graham, T. (2015). Designing electronic information systems for the future: Social workers and the challenge of New Public Management. *Critical Social Policy*, 36(2), 187-204.

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Keywords

choice, technology, web, ratings, reviews, decision-making, categories, standards, social media, information infrastructure

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Abbreviations

EDA	**E**xploratory **D**ata **A**nalysis
EMIS	**E**gton **M**edical **I**nformation **S**ystems
HC	**H**ierarchical **C**lustering
HTML	**H**ypertext **M**arkup **L**anguage
ICT	**I**nformation and **C**ommunications **T**echnology
ISBN	**I**nternational **S**tandard **B**ook **N**umber
MCA	**M**ultiple **C**orrespondence **A**nalysis
NHS	**N**ational **H**ealth **S**ervice
Ofcom	**O**ffice of **C**ommunications
RS	**R**ecommender **S**ystem
STS	**S**cience and **T**echnology **S**tudies
ToC	**T**echnologies **o**f **C**hoice
UK	**U**nited **K**ingdom
WWW	**W**orld **W**ide **W**eb

"Citizens shape their lives through the choices they make about family, work, leisure, lifestyle, and personality and its expression. Government works by 'acting at a distance' upon these choices, forging a symmetry between the attempts of individuals to make life worthwhile for themselves, and the political values of consumption, profitability, efficiency, and social order."

Nikolas Rose (1999, pp. 10-11)

"Machines are the concealed wishes of actants which have tamed forces so effectively that they no longer look like forces."

Bruno Latour (1988, p. 204)

"... I cannot give you coherent directions as to which of two courses you are to take; I will lay the two alternatives before you, and you must consider them for yourself."

Homer, *Odyssey* (Book 12, Lines 99-100)

Chapter 1

Introduction

1.1 Background to the study

In contemporary capitalist societies, individuals experience more 'choice' than ever before. From childhood until death, from the moment we wake each day until we fall asleep, we face a "wide-ranging and unending series of choices" across almost every domain of life (Clarke, 2010, p. 58). We choose which food to eat, what clothes to wear, the style of haircut we wish to have, the people we associate with, what types of insurance to purchase (or not purchase), what kind of career and lifestyle to pursue, which movie or TV show to watch on a Friday night, which bank accounts and superannuation schemes best serve our finances, *ad infinitum*. Choice, that is, the options that individuals have at their disposal as well as the ability to compare between them and make a decision, has been argued to be fundamental to individual freedom, autonomy, and wellbeing (Johnstone, 2011; Leotti, Iyengar, & Ochsner, 2010), and the development of modern Western society (Rosenthal, 2005; Salecl, 2009). It enables people to cultivate an individual sense of self and exercise the right to direct their own lives and practices of consumption. As Iyengar suggests, there is a feedback loop between self-identity and choice: "If I am this, then I should choose that; if I choose that, then I must be this" (2011, p. 109). Ostensibly, it would appear that choice is a universal good, that is, 'more choice is better'. However, choice is conceptually and pragmatically complex and problematic.

Arguably, a challenge concerning choice is that contemporary capitalist societies have an over-abundance of it (Clarke, 2010; Iyengar, 2011). For example, counting the products in his local supermarket, Schwartz (2005) observed that there were 275 varieties of cereal, 230 types of soup, 285 kinds of cookies, and 40 toothpastes, to name a few. Although choosing the wrong breakfast cereal is not particularly consequential, other choices, such as finding the right private health insurance within a vast and complex insurance market, are more difficult and have greater consequences for future life chances. Whilst *too little* choice can be detrimental, *too much* choice threatens to overwhelm individuals and undermine their agential capacities, mitigating the benefits that choice can provide. Recent scholarship has characterised choice in contemporary society as a paradox (Schwartz, 2005), an explosion (Iyengar, 2011), a tyranny (Salecl, 2011), and even a myth (Greenfield, 2011).

Further, choice is not something that simply exists, but is actively made. As Henman argues, "to see our choice ... solely as an exercise of freedom misses the ways in which the choices we make, the range of choices on offer, and the location in which we make choices is intensely manufactured, shaped, and governed" (Henman, 2007, p. 171). Indeed, much scholarship has examined how choice is 'nudged' (Thaler & Sunstein, 2009) and 'framed' (Callon, 1998; Kahneman & Tversky, 2000) through the configuration of material and discursive elements, which subtly influences or shapes decision-making. At the same time, choice has become a compelling policy principle in many advanced welfare states, such as Australia and the UK (Le Grand, 2007; Newman & Kuhlmann, 2007; Rosenthal, 2005; Taylor-Gooby, 1998). Choice has been installed into public service discourse to improve cost-effectiveness and create efficiency through competition (Hunter, 2009; Le Grand, 2007), according with neoliberal approaches to New Public Management (Hasenfeld & Garrow, 2012) and market-based reform (Clarke, Newman, & Westmarland, 2008). Citizens are now positioned as *consumers* who are active choosers of public services rather than passive recipients without choice (Conklin, Morris, & Nolte, 2015; Fotaki, 2011). Citizens qua consumers have the right to choose and exercise their consumer rights in a public services context, for example, choosing a preferred GP and choosing between treatment options offered by the doctor (Downie & Randall, 2008), or choosing how to spend a disability support package in order to meet individual needs and preferences (Windholz, 2014). Indeed, choice increasingly appears as an inescapable condition of citizenship in advanced liberal states. As Rose argues, a right to choose is increasingly an *obligation*:

we are forced to choose in order to be free, regardless of whether we want it or not (1999b).

Individuals are not passive in this choice-infused environment. They actively draw on a range of tools, knowledge, and heuristics in order to help them navigate choice and make 'informed' decisions. In contemporary times, one of the most important and pervasive tools is the Internet and, more specifically, the World Wide Web (herein 'web'), an information space that runs on the Internet. The advent of what is popularly referred to as 'Web 2.0' (Han, 2011) has engendered a 'participatory' logic to the web (Blank & Reisdorf, 2012). In this way, users are facilitated to co-produce content, communicate, and interact with one another within web-based 'platform' environments that become more valuable through user attention and activity, that is, via emergent 'network effects' (Blank & Reisdorf, 2012, p. 538-539). Moreover, the advent of Web 2.0 has opened up a world of choice through a proliferation of consumer and e-commerce websites that have transformed consumer-based economies (Dholakia, 2012). These websites present users with different landscapes of choice. For example, popular e-commerce websites such as Amazon and eBay position users as co-producers of sprawling online market places (e.g., reading and writing reviews, providing ratings, making purchases, selling goods, etc.). 'Comparison shopping websites' enable users to compare prices between sellers (e.g., Shopbot.com, BizRate.com). Similarly, 'reviews websites' (e.g., TripAdvisor.com, Yelp.com) and 'ratings websites' (e.g., RateMyTeachers.com, DoctorScoreCard.com) provide users with information to compare businesses and professionals. The features and functionalities that underpin these types of sites have recently been conceptualised in the literature as having a 'logic of evaluation' (Ziewitz, 2012). In the research reported in this thesis, I conceptualise and examine these ranking, ratings, and reviews schemes as tools (within a broader set) to construct and govern spaces of *choice*. In doing so, the study imputes a logic of choice to understanding and examining the architecture and design features of web spaces that enable users to compare, measure, and make decisions about goods and services.

Before proceeding further, I would like to consider five brief scenarios that illustrate the kinds of websites that function to provide different kinds of online spaces in which 'choice' is experienced and enacted by users.

A father of three is involved in a car accident. He only sustains minor injuries, but the experience leads him to decide to purchase life insurance. There are many insurance companies and options to choose from and the policies seem complicated, which results in him 'putting off' the task of choosing an

insurance provider. He visits *Compare The Market* to help him make an informed decision, reducing the market down to just three options that are then compared (Figure 1.1).

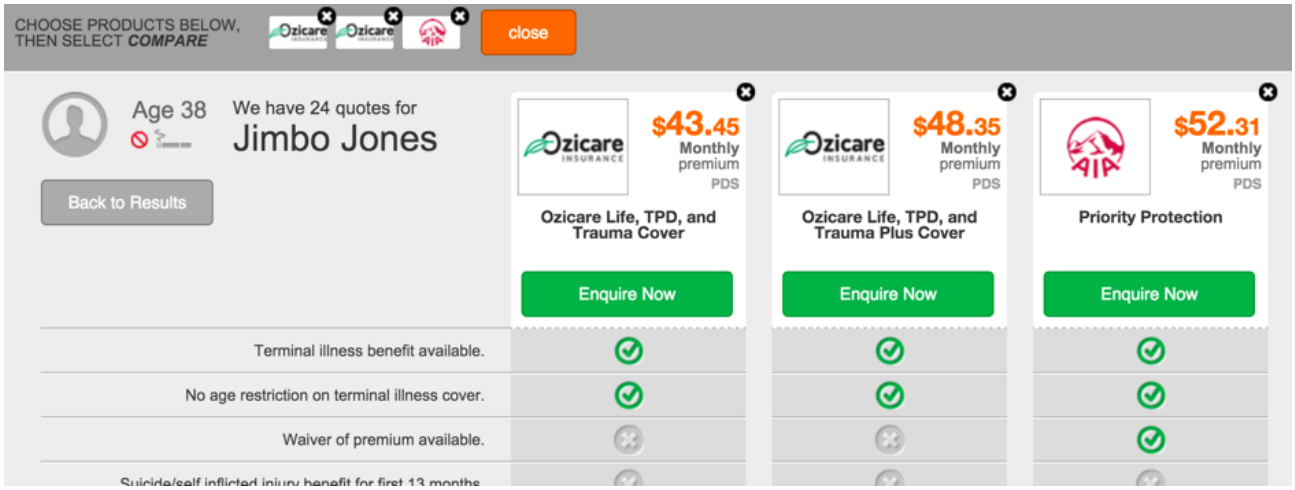


Figure 1.1: Comparing life insurance on comparethemarket.com.au

Three friends are shopping and wish to go out for lunch, but they face a dilemma. One person wants sandwiches, one person requires gluten-free options, and the other doesn't want to spend too much money. This, however, poses no problem: they visit yelp.com to compare nearby restaurants, quickly locating an option that satisfies each of their specific requirements (Figure 1.2).

Figure 1.2: Comparing inexpensive, gluten-free restaurants on Yelp

A man living in Ilford, Essex (United Kingdom) needs to find nearby services for psychological therapies. He visits the UK Government's NHS Choices website and compares between services in his area. He does not have a car or private transport. Goodmayes Hospital is within reasonable walking distance, but it only has a '2 star' rating (Figure 1.3). He wonders what this might mean. Are

the services offered there worse than the services in the other areas (that he is not in a position to benefit from because they are too far away to travel to)? He goes ahead and makes a booking.

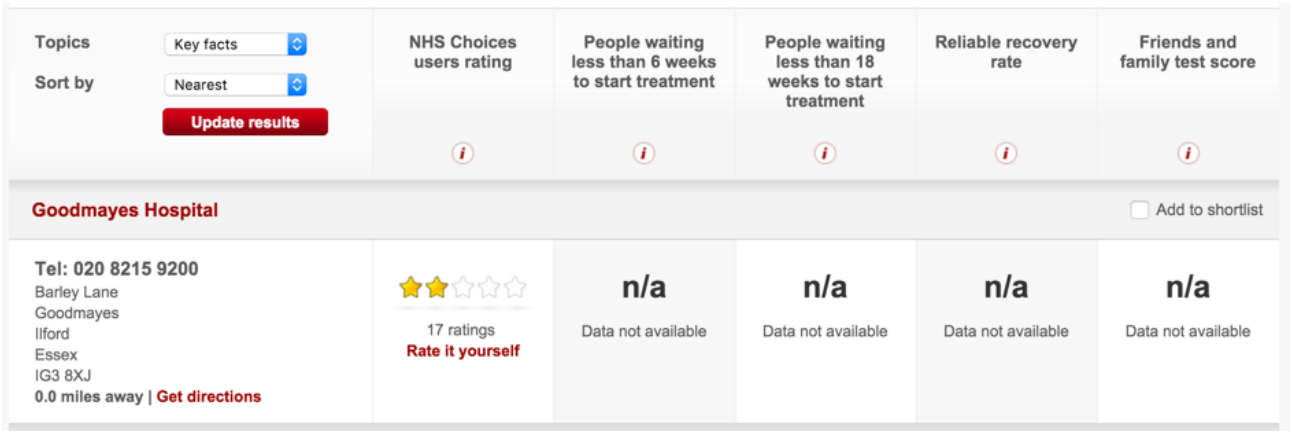


Figure 1.3: Comparing psychological therapies services on the UK Government's NHS Choices website

A woman wishes to purchase a new lawnmower because the old one appears to have a broken carburetor. She compares models and prices on Amazon, but plans to purchase and pick up the lawnmower at a local store rather than online. While comparing lawnmowers on Amazon, she notices product recommendations for lawnmower carburetor repair kits. These are inexpensive and have received many '5 star' ratings, so she decides that it might be worth trying to fix the old lawnmower before purchasing a brand new one. She 'accepts' the recommendation and chooses to purchase a repair kit on Amazon, rather than a new lawnmower from a local store.

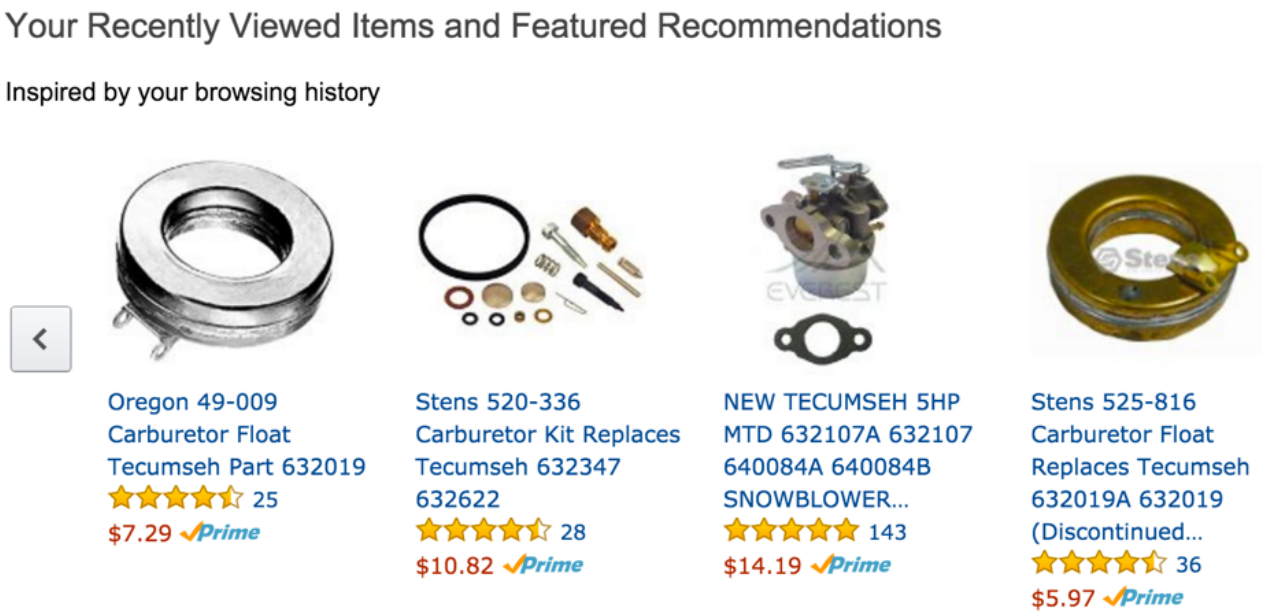


Figure 1.4: Personal recommendations for lawnmower repair products on amazon.com

A sole parent moves to the suburb of Campsie (Australia) and needs to find a public school for her ten-year-old son. She Googles "compare schools in Sydney" and follows the link to myschool.edu.au. Using My School, she is able to compare the statistical performance of schools near Campsie, but is not able to compare other aspects of interest such as the quality of after school care or ratings and reviews submitted by other parents (Figure 1.5). It turns out that there are really only two schools (Campsie Public School and Harcourt Public School) that are close enough to travel each day, and they are both slightly below average in terms of performance compared to the national average. She decides to call Campsie Public School.

Harcourt Public School, Campsie, NSW

Results in numbers

The National Assessment Program – Literacy and Numeracy (NAPLAN) assesses all students in Australian schools in Years 3, 5, 7 and 9. For more information visit the NAPLAN website.

The chart below displays average NAPLAN scores for each domain. The selected school's scores are displayed in blue. Also displayed are average scores for statistically similar schools (SIM) and all Australian schools (ALL). The coloured bars indicate whether the selected school's scores are above, close to, or below the other scores.

2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014

Colour Scheme: Orange & Blue — Submit — Alternate view: Results in graphs

	Reading		Persuasive Writing		Spelling		Grammar and Punctuation		Numeracy	
Year 3	403 (390 - 417)		387 (375 - 398)		452 (439 - 464)		429 (414 - 443)		413 (401 - 425)	
	SIM 423 (414 - 432)	ALL 418	SIM 404 (396 - 412)	ALL 402	SIM 411 (403 - 420)	ALL 412	SIM 428 (418 - 438)	ALL 426	SIM 405 (397 - 414)	ALL 402
Year 5	477 (462 - 491)		448 (434 - 461)		517 (503 - 530)		500 (484 - 515)		503 (490 - 516)	
	SIM 504 (496 - 513)	ALL 501	SIM 469 (461 - 478)	ALL 468	SIM 496 (488 - 504)	ALL 498	SIM 505 (496 - 514)	ALL 504	SIM 489 (481 - 497)	ALL 488

Figure 1.5: Comparing the statistical performance of schools in Australia on the My School website

Most individuals living in capitalist societies have used, or are at least aware of, popular websites such as amazon.com or yelp.com. These kinds of websites are now a routine feature of our technologised lives. While the above scenarios are intended to provide only a cursory illustration of the diversity of these kinds of websites, it is clear that their usefulness and role extends into a range of private and public spheres, including commercial goods, consumer services, health, and education. Moreover, the above scenarios share a common theme: individuals using the web to both *experience and enact* choice in a range of different life contexts. The kinds of websites in these scenarios, or more specifically the architecture and design features that they deploy, appear to play a key role in constructing 'choice' in contemporary society. What these scenarios illustrate is that choice is nowadays experienced and constructed through the web *at scale* across a range of social contexts. Some of these scenarios, such as decisions relating to health and education, have potentially serious consequences for individual wellbeing and future life opportunity. In other cases, websites such as Yelp.com are entangled in mundane, everyday choice-making, such as finding a restaurant that suits individual preferences and geographic location. Moreover, these kinds of websites constitute *spaces* of choice, where choice is both experienced by individuals (the type and range of options on offer) and enacted (making informed decisions using the tools and functionality provided).

The websites in these scenarios serve to illustrate how the architecture and design features of each web space appears to structure or shape 'choice' in different ways. Hence, imputing a logic of choice to these websites opens up a space to critically examine and problematise these seemingly benign technologies. This is not to suggest that these websites are reducible or essential to choice, or that choice is somehow determined through them, but rather that there appears to be a 'logic of choice' operating within the web space, in some ways similar to the 'logic of evaluation' that Ziewitz identifies (2012). For example, drawing on the examples provided previously, does the man comparing life insurance on Compare The Market understand that the 'market' is not *the complete market*, but only those insurance providers that are under contract with the website - i.e., a subset of the market? Would the friends buying lunch have been able to find a suitable place to eat without Yelp providing the ability to compare restaurants based on a cost-effectiveness metric and to filter for 'gluten free' options? In the case of Amazon, would the woman have purchased the lawnmower repair kit if not for the personal recommendation that appeared on the page? For the parent choosing a new school for her son, what difference would it have made if the My School website included ratings and reviews submitted by other parents, rather than statistical data about school performance?

These scenarios illustrate how the absence or presence of particular architectural and design features structures the space of choice in different ways, which in turn shapes choice without determining it. This study conceptualises and examines this phenomenon as 'Technologies of Choice' (herein ToC). For now, ToC are defined as the design features and architecture of websites that enable users to navigate choice and compare between options to make decisions. This working definition of ToC is expanded further in the next chapter through the development of a conceptual framework.

1.2 Significance and aims

This study proposes a novel conceptual approach to understanding and empirically examining how choice is constructed on the contemporary web. It examines and reinterprets websites such as yelp.com and amazon.com in terms of a logic of choice, seeking to investigate *how* choice is constructed and rendered operable in these online spaces. The research provides an original account of how choice is made coherent and practical through the web. It positions and examines ToC as a kind of 'information infrastructure' (Bowker, Baker, Millerand, & Ribes, 2010) that has rapidly

become a standard in late modernity, branching out and becoming embedded in almost every conceivable field of social and economic life, yet currently under-researched and under-theorised. As Bowker (2002) suggests, a common-sense conception of infrastructure may construe it as simply benign or uninteresting, something that other things run on top of, such as railroad tracks, roads and highways, and electricity grids. However, this common-sense definition of infrastructure "begins to unravel when we populate the picture, and begin to look at multiple, overlapping, and perhaps contradictory infrastructural arrangements" (Bowker, 2002, p. 2). ToC, viewed as a kind of infrastructure, has a powerful role in shaping individual and social realities through a logic of 'choice'. ToC are the infrastructure that people use to navigate and experience choice through the web - to sort, classify and compare options to make the right choices for them amidst a complex world of choice. Yet, we presently have little understanding of this phenomenon. What is this infrastructure and how does it construct and govern choice in contemporary society?

This study does not seek to determine whether web-based technologies are 'good' or 'bad' for choice, or whether such technologies 'empower' or 'disempower' choice for individuals or social groups. Similarly, it does not ask how web-based technologies determine or 'manipulate' choice, but instead uses an ontologically attuned approach to account for how choice is *constructed, shape, and governed* in online spaces (through ToC). This study goes beyond constituting these technologies as simply 'neutral tools' for navigating choice, to reason about how these technologies are embedded with politics and are strategically positioned within websites because of their affordances for constructing and governing choice. It examines the blurring of human and non-human: how algorithms, categories and standards, and technical infrastructure circulate alongside individuals, simultaneously enrolled constructing 'choice' in the contemporary context.

Given this context, it is curious that so few studies in sociology or science and technology studies (herein 'STS') have attempted to conceptualise and examine this intersection of choice and web technology. For sociology, this is perhaps reflective of the traditional exclusion of objects and technical artefacts from the realm of the social. As Lindemann argues: "In order to delimit the realm of social phenomena, sociologists refer implicitly or explicitly to a distinction between living human beings and other entities, that is, sociologists equate the social world with the world of living humans" (2005, p. 69). This study is significant because millions of people each day use the web to navigate choice and make decisions about consumer products, health issues, recreational services,

and more. The websites they use impact upon these choices and thus, to a greater or lesser extent, potentially shape individuals' future life chances and sense of self. Yet, little is currently known about how choice is shaped through the design features and architecture of such websites, that is, through ToC. Furthermore, little is know about the scale and extent to which ToC have proliferated across the contemporary web. What portion of the world's top-ranking websites deploy ToC? How, and to what extent, are ToC deployed in different social contexts and settings? From an empirical perspective, how widespread is this phenomenon? Are ToC a significant part of our contemporary web experience?

This thesis challenges the concept of choice, denaturalising how choice operates and is presented in a web-mediated world, extending the focus beyond 'decision-making' to consider how websites curate and govern not only the decision-making capacities of individuals but also choice itself, that is, the options on offer. Indeed, there is currently no framework to conceptualise and examine the confluence of choice and web technologies. What are the different components that are enrolled in constructing web spaces in which 'choice' operates? How is 'choice' constructed and shaped through the web? Where does knowledge about the options on offer come from, and how it is produced? How is choice facilitated through the functionalities provided to users? These questions pertain to a significant and currently under-researched topic in social science, and this study seeks to contribute greatly to our understanding of this topic.

To date, the scholarship in this emerging field has been relatively sparse, possibly because it moves beyond existing (single) disciplinary boundaries. As discussed in Chapter Two, sociological studies have examined the role of ratings, reviews and rankings schemes in, for example, evaluation and governance (Ziewitz, 2012), the performance and configuration of markets (Pollock, 2012; Scott & Orlikowski, 2012), and modes of knowledge production (Blank, 2007), yet theorisation of 'choice' is largely absent. Given the important and complex role of choice in contemporary society, as well as the proliferation of websites that appear to structure choice, there is a pressing need to examine this further both theoretically and empirically.

The aim of this study is to conceptualise and empirically examine how choice on the web is shaped through ToC. It contributes novel theoretical and empirical insights about the nature, role, and shaping of choice in a web-technologised world. In this way, ToC incorporate, but are not limited to, the kinds of ratings, reviews, and rankings features of websites that have become the subject of

recent scholarly debate. This study aims to expand and develop current research into the conceptual realm of 'choice', that is, not only 'decision-making' or particular ratings and rankings devices, but the broader and more encompassing notion of choice. The study aims to contribute a conceptual framework to the literature that will also serve as an analytical tool to empirically analyse websites that deploy ToC (e.g., the websites mentioned in the previous scenarios). It will provide a kind of 'grammar' for understanding and analysing ToC websites, providing a much needed conceptual and empirical tool for future research in diverse fields, including sociology, STS, social informatics, cultural studies, and marketing. Indeed, this study draws together respected scholarship in diverse fields, including STS, Foucaultian social theory, current and emerging social perspectives of choice, social informatics, and Internet studies. Further, this study is significant in terms of assessing the actual presence of ToC on the web. It aims to provide foundational empirical insights about the extent to which ToC have proliferated throughout the contemporary web, including the patterns of their deployment. Following this, the study seeks to examine whether there are different 'types' of ToC that can be identified from the patterns of how ToC are actually deployed within websites. This will provide the ability to reason theoretically about the extent to which choice is shaped differently by different types of ToC.

To achieve the overall aim of this study, one over-arching research question (RQ1) is posed:

How is 'choice' constructed on the web?

In addressing this question, three sub-questions are posed (SQ1, SQ2, and SQ3):

- *(SQ1)* What are the different features of websites that constitute and structure choice?

- *(SQ2)* How widespread are ToC on the web and what are their patterns of distribution?

- *(SQ3)* What different types of ToC are identifiable and to what extent do they shape choice differently?

1.3 Approach to the study

In this study I take a particular approach to understanding and conceptualising both *technology* and *choice*.

In considering web technologies as an object of social inquiry, there is a risk that a study of this nature could lapse into perceived technological determinism, as Kallinikos (2011) points out. As I discuss in the next chapter, critical perspectives of technology highlight the mutual shaping of technology and society. These approaches tend to eschew the notion that technology is simply a social artefact open to any interpretation (social constructivism), and on the other hand technology as a force that determines social change and human agency (technological determinism). Instead, we are led to account for the ways in which the social and the technological are inextricably interconnected, shaping one another in complex and often non-linear ways. Technology is not held as neutral nor objective. Rather, technologies have politics that embody particular modes of viewing and thinking about the world, which draws attention to 'what things do' (Verbeek, 2005). Whilst this thesis has a focus on the 'technology-shaping-society' side of the debate, it is attuned to an ontological perspective of technology that positions it critically in relation to society and individuals.

In understanding and conceptualising 'choice', I take a broadly constructionist approach. In this study, choice is not regarded as something that exists externally or *a priori* to human affairs. Following the literature discussed in Chapter Two, choice is actively *constructed* - it is not neutral. It both presupposes and produces the social, symbolic, and economic realities in which it takes place. This is no less true of how choice is constructed on the web, and in this study I examine this more specifically in terms of the design features and architecture of websites, referred to and conceptualised as ToC. This approach interfaces with the ontologically-attuned perspective of technology I adopt in this study.

From a methodological point of view, I use a combination of qualitative and quantitative methods to answer the over-arching research question, that is, how is 'choice' constructed on the web?

Firstly, the first research sub-question (SQ1) asks: what are the different features of websites that constitute and structure choice?. To answer this question, I develop a conceptual framework in two steps. The first step is theoretical, drawing together and synthesising the literature to determine the over-arching 'dimensions' of ToC. The second step is empirical, involving the analysis of 30 top-ranking websites to further develop and elaborate the conceptual framework, resulting in the addition of 12 'sub-dimensions' and 56 'features' to the conceptual framework.

Secondly, after the conceptual framework is developed, it is then applied as an analytical tool to perform content analysis of 193 ToC websites identified from within a sample of 500 top-ranking

websites. The analysis of these data provide an answer to the question of how widespread ToC are on the web and their patterns of distribution (SQ2). It provides foundational empirical insights about how choice is shaped on the contemporary web.

Thirdly, the final research sub-question (SQ3) asks: what different types of ToC are identifiable and to what extent do they shape choice differently?. The approach that I take to answering this question has a distinctly computational flavour. Drawing on the notion of 'computational sociology' (Hummon & Fararo, 1995), I utilise a combination of computer science methods, social theory, and empirical data. Specifically, a novel application of multiple correspondence analysis (MCA) and hierarchical clustering (HC) is used to determine whether there are patterns or 'clusters' of ToC, that is, particular sets of ToC features that tend to be deployed together on websites. This provides the basis to reason theoretically about how choice is shaped in particular ways through ToC.

1.4 Thesis structure

The thesis is structured into seven chapters. The next chapter, Chapter Two, serves two purposes. First, it reviews relevant bodies of literature that inform the study, including key theoretical perspectives, in order to cohere and draw them together into a conceptual framework. In order to understand 'choice', this chapter begins by defining and problematising choice in contemporary society. It draws on a range of literatures branching sociology, STS, psychology, and economics. Likewise, given that this study is about technology, I subsequently address the notion of technology and how it is thought about in this study. In this way, I appeal to an ontologically-attuned perspective that accounts for the mutual co-shaping of technology and society. In order to report research as it relates to the topic of this study, I then examine what we know about *choice and web technologies*. The conceptual framework containing 4 over-arching 'dimensions' is presented in the final section of Chapter Two. It is developed from a critical engagement with the literature, and fulfills the second purpose of Chapter Two. The ToC conceptual framework provides the basis for the work undertaken in Chapter Four, where it is developed and further elaborated through an empirical analysis of 30 websites (and four 'supplementary' websites, as discussed in Chapter Three).

Chapter Three sets out the research design and methods of the study, addressing the research design and methods, including a consideration of ethics and limitations for the study. Chapter Three details the methods that are used to answer the research questions. Although the research sub-questions involve analysis of websites, they each have a different scope. Analysis relating to the development of the conceptual framework is largely textual, utilising a modified form of textual analysis to refine and elaborate the conceptual framework using empirical data, whilst analysis for the remaining questions is quantitative, involving content analysis using the conceptual framework as an analytical tool, and statistical analysis of the resulting data. In all respects, the research questions pose various issues relating to rigour and method, and these are addressed in turn.

In Chapter Four, a purposive sample of 34 websites is examined in order to refine and elaborate the conceptual framework developed in Chapter Two. Chapter Four culminates in a revised conceptual framework. Within 4 over-arching 'dimensions' identified in Chapter Two, the revised conceptual framework includes an additional 12 'sub-dimensions' and 56 'features' spread across the sub-dimensions. It provides an analytical framework to empirically analyse how choice is shaped through the characteristics and design features of websites, that is, through ToC.

In Chapter Five, the elaborated conceptual framework is applied as an analytical tool to examine a sample of 500 top-ranking websites. The data collected are then analysed using a range of statistical methods. In order to understand how widespread ToC are, and how ToC features are distributed throughout the web (SQ2), descriptive statistics and significance tests (Fisher's Exact) are used to identify the distribution of ToC and its features. Furthermore, in order to identify whether there are different 'types' of ToC (SQ3), Multiple Correspondence Analysis and Hierarchical Clustering are used to uncover the underlying patterns and clustering of the data. This work provides part of the answer to SQ3 and provides the basis to answer the remaining part of SQ3 in the next chapter, that is, how do these types or 'clusters' of ToC shape choice differently?

In Chapter Six, a discussion of the findings from Chapter Five is undertaken in order to answer the remaining component of SQ3, and provide the final 'piece of the puzzle' for answering the over-arching research question of the study: how is choice constructed on the web? The 'clusters' of ToC features that result from analysis in Chapter Five are interpreted as the types or 'modalities' of ToC. Three key themes emerge from the findings and these are used to structure and cohere the discussion, which centres around understanding how choice is shaped and governed differently

through each ‘modality’. These themes are: (1) Epistemologies of ToC; (2) Individualisation and Subjectivity of ToC; and (3) Political Economies of ToC.

Chapter Seven provides a summary of the findings, including a discussion of the study’s contribution to knowledge, a consideration of limitations, and areas for future research. The study concludes with a brief reflection on the overall project, and what it means now and into the future.

Chapter 2

Literature Review and Conceptual Approach

Given the study's examination of how choice is shaped through the web, I review several key intersecting bodies of literature. The literature review is structured into four main sections that build upon one another to simultaneously contextualize the research and formulate a conceptual framework for advancing the aims of the study. The first section seeks to define what 'choice' is and to elucidate this concept within different disciplinary perspectives. It reviews and problematises the ways in which choice operates in contemporary society, with specific attention drawn towards contextualising choice in respect to both private and commercial spheres as well as public policy and governance. The second section analyses the notion of technology and evaluates different perspectives on technology, paying particular attention to the political and the ontological dimensions of technologies, given their pertinence for this study. The third section draws on Foucaultian theories of governance to consider the relationship between choice and governance, directing the focus towards how governance is performed through technologies and the materiality of spaces, and how this relates to constructing and shaping choice. The fourth section addresses the nascent literature on the relationship between choice and information and communication technology (herein 'ICT'), and more specifically the web. The final section builds upon and synthesises the previous discussion in order to produce a four-dimensional conceptual framework used in this thesis.

2.1 Choice

2.1.1 Definitions, concepts, empirical studies

A central concept in this study is 'choice', but what does choice mean and how is it understood? The Oxford Dictionary of English defines choice as both a *noun* and an *adjective* (Stevenson, 2010). As a noun, choice is defined as "an act of choosing between two or more possibilities: *the choice between good and evil*". As a mass noun it refers to "the right or ability to choose: *I had to do it, I had no choice*". As an adjective, 'choice' describes something of very good quality ("he picked some choice early plums"), or rude and abusive language ("he had a few choice words at his command"). Choice is recursively defined in terms of 'choosing'. In this way, choice and choosing are inextricably intertwined, and 'choose' is defined as a *verb*: to "pick out (someone or something) as being the best or most appropriate of two or more alternatives: *there are many versions to choose from*" (Stevenson, 2010).

Using these lexical definitions as a point of departure, 'choice' appears to have ontological (noun) and epistemological (adjective) dimensions, and it also relates to agency (as a verb, 'choose'). Yet, one is inclined to ask: how does choice differ from 'decision-making'? Why focus on choices as opposed to decisions? At first glance it would appear that these two concepts are almost identical, perhaps even interchangeable. In popular discourse this often appears to be the norm. However, despite the conceptual and definitional 'fuzziness' between these two concepts, there are important distinctions to be made that set a conceptual foundation for this study. Note that my aim here is not to enforce some 'pure' demarcation of choice versus decision-making, but instead to trace and clarify some key conceptual differences that provide important preliminaries for the study, that I will build on throughout this chapter.

First, choice appears more like an *abstract capability*, akin to a right or condition of opportunity, whereas a decision is more a *temporally-constrained process and its result*. Indeed, in the Oxford Dictionary of English, 'decision' is defined as a *noun*: "a conclusion or resolution reached after consideration: *I'll make the decision on my own*". The interrelated word 'decide' is defined as a *verb*: to "come or bring to a resolution in the mind as a result of consideration: *she decided that she liked him*" (Stevenson, 2010). The notion of 'resolution' is the focus of decision-making, whereas this is

only aspect of 'choice', albeit an important one. The second major conceptual difference between choice and decision-making is that choice concerns both the *external reality or context* (the options that are being compared, the space or context in which choice takes place) as well as the *internal reality* of the 'chooser' (temporally-constrained processes geared towards a terminal endpoint where choice resolves into a decision, that is, the outcome and the processes and patterns that lead to it). As Clarke suggests, "choice involves not just reacting to the world, it involves appraising it - seeing what is there; construing it - deciding how it is organised; making sense of it - putting it in the chooser's context; and identifying a response" (2010, p. 10). In this way, perhaps a useful heuristic is to consider decision-making as a *subset* of 'choice'. For example, in a multiple choice exam question, 'choice' can be understood as the options on offer (A, B, C, and D), as well as the opportunity or capability to select an option, whilst the 'decision' relates more to which option was selected within the constraints of the time limit, given the information provided. Choice attends more to the context, the space, the conditions and zone *in which decisions take place*, whereas decision-making focuses more on the *resolution or outcome and the predictors and patterns* that link up and relate to it. If the student sitting a multiple choice exam finds that there are not four, but *twenty-four* options per question, they might say, 'there are too many choices' or 'there is too much choice', as opposed to 'there are too many decisions'. Thus, decision-making is a key part of choice, but not all there is to it.

Perspectives on how people experience and enact choice have traditionally been based on models of human behaviour centred around the notion of rationality (Arrow, 1984; Friedman & Savage, 1948; Marschak, 1950). In the field of economics, prevailing economic theory conceives of individuals as rational agents, capable of making decisions that maximise their self-interest. This model of human rationality is often conceptualised through the figure of 'homo economicus' (Dixon & Wilson, 2012; Foucault & Senellart, 2008), which constructs people as economic calculating beings, intent on maximising self-interest. In these literatures, although the notion of choice is often used interchangeably, or even conflated, with decision-making, prevailing economic theory resonates more conceptually with the latter. In this respect, classical utility theories are concerned with the end result (the decision) and the patterns and processes that correlate with it (decision-making). This is certainly a key and important component of choice, but only one aspect of the bigger picture. Moreover, classical utility theories of decision-making came under critique within economics, and in

particular behavioural economics, at least in part due to poor performance when applying such models to predict or explain complex, real-world phenomenon (Kahneman & Tversky, 2000). As a result, further developments have emerged to more adequately account for the complex nature of decision-making, notably: decision theory (Gilboa, 2010, 2011); bounded rationality (Kahneman, 2003; Rubinstein, 1998; Simon, 1982, 1992; Tisdell, 1996); and prospect theory (Kahneman & Tversky, 1979; Kahneman & Tversky, 2000; List, 2004; Wakker, 2010). The emergence of these sub-fields signals a movement away from mechanistic, reductive, or atomistic perspectives of decision-making, towards more nuanced models that are attentive to complexity and context, while still constitutive of the notion of rationality. I will return to some of these recent developments later on.

In psychology, considerable challenges to classical utility theories have emerged since at least the 1950s (Simon, 1956, 1957). These challenges have served to highlight and examine incongruities between rational models of human behaviour and the models and empirical studies of choice in psychology (Schwartz, 2000; Slovic, Finucane, Peters, & MacGregor, 2002). Empirical and theoretical studies have explored how choice is affected by: emotions (De Martino, Kumaran, Seymour, & Dolan, 2006); personality (Purvis, Howell, & Iyer, 2011); cognitive ability (Bruine de Bruin, Parker, & Fischhoff, 2007; Edward & Colleen, 2009; Frederick, 2005); how choices are framed and presented (John, 2011; Schwartz, 2000; Thaler & Sunstein, 2009); changing preferences (Lichtenstein & Slovic, 2006); and learning from previous choices (Brandstätter, Gigerenzer, & Hertwig, 2006; Gigerenzer, Hertwig, & Pachur, 2011; Hertwig & Herzog, 2009).

Recently, psychological perspectives on decision making have begun to focus on ethical, cultural, and social aspects of decision-making (Garrison, 2008). These studies broadly appear to fall within the remit of 'choice' because they attend to choice as an abstract capability (a right or privilege) as well as the space in which decision-making is exercised (the extent and variety of options on offer). Studies in social psychology have explored and provided evidence of the positive effects of choice, for example, enhancing individual wellbeing, satisfaction and sense of freedom (Johnstone, 2011; Leotti et al., 2010). Certainly, the "choice is good" thesis has much merit. At the same time, however, a key insight that has emerged in recent literature is that *too much choice* can be problematic (Clarke, 2010; Iyengar & Lepper, 2000; Schwartz, 2005). As Iyengar argues, "for all its positive qualities, however, a wide variety of choice can also be confusing and overwhelming" (2011, p. 179). Consumer behaviour

and marketing studies refer to this as the 'too-much-choice effect' or 'choice overload' (Cristol & Sealey, 1996; Gingras, 2003; Reed, Chok, & Brozyna, 2011).

Whilst there is some debate about when and why the too-much-choice effect can occur (Greifeneder, Scheibehenne, & Kleber, 2010; Lauren, Mathew, & Sabine, 2011), it is evident that people experience a range of negative effects when they are presented with too many options to choose from. These negative effects include being overwhelmed (Chua & Iyengar, 2008), increased anxiety (Schwartz, 2005), decreased satisfaction (Botti & Iyengar, 2004; Reutskaja & Hogarth, 2009; van Loo, 2010), demotivation (Iyengar & Lepper, 2000; Scheibehenne, Greifeneder, & Todd, 2009); and deferment of decisions (Lauren et al., 2011). What these studies point towards is the co-constitutive, and often problematic, relationship between choice qua noun and choice qua adjective. For example, as the number of different 'choices' (noun) of health insurance increases, the task of finding a 'choice' (adjective) health insurance plan becomes more difficult and problematic.

2.1.2 Choice in contemporary society

A growing number of scholars argue that "choice overload" is a defining characteristic of modern society and the experience of individuals living in such societies. Clarke argues that people nowadays are confronted with "a wide-ranging and unending series of choices" across almost every domain of life (Clarke, 2010, p. 58). Iyengar echoes this sentiment, arguing that the expansion of choice has become an explosion of choice (2011, p. 188). The emergence of the 'consumer society' provides one account of this 'explosion' of choice - in consumer societies individuals take on the role of consumers who exercise freedom through the right to choose (Bauman, 2007). In this way choice is integral to market societies that revolve around the production and consumption of goods and services (Spies-Butcher et al., 2012; Rosenthal, 2005), constituting a means through which individuals exercise freedom, for example, voting in democratic elections and choosing products to suit personal requirements.

For modern consumer societies, the opportunity to exercise choice through consumption defines and constitutes citizenship. The individualisation thesis represents one dominant account of this. In advancing the notion of individualisation, Beck and other scholars describe contemporary social transformations in which the individual becomes the core unit of social life, brought about by the breakdown of tradition alongside processes of structural fragmentation that contributes to highly

individualised and reflexive subjectivities (Beck, 1992; Beck & Beck-Gernsheim, 2002; Bauman, 2001; Giddens, 2001). Individualisation brings to bear a triadic entanglement of choice, freedom, and citizenship, which are imbricated in the construction of modern selves and societies.

Choice is regarded as fundamental to self formation. Individuals qua consumers cultivate a sense of self through the choices they make in consumer societies where nearly every aspect of life is self-referenced (Rose, 1999a). Beck argues that in the contemporary experience of individualisation, "the human being becomes ... a choice among possibilities, *homo optionis*. Life, death, gender, corporeality, identity, religion, marriage, parenthood, social ties – all are becoming decidable down to the small print; once fragmented into options, everything must be decided" (2002, p. 6). In a similar way, Iyengar suggests that there is a kind of feedback loop that operates between identity and choice (2011), in which our sense of self and the choices we make are recursively defined. *Homo optionis* provides an interesting counterpoint to the figure of *Homo economicus* discussed previously. In the context of individualisation, the 'rational, calculating agent' takes on a somewhat kaleidoscopic and ephemeral guise, as individual preferences reflexively shift and transform in relation to an evolving self-conception amidst processes of structural fragmentation. In short, even if homo economicus knows *a priori* what they really want to choose, the options are too many and too varied to calculate: *rationality* is perhaps closer to an ideal than a practice.

From a social perspective, it is clear that not everyone experiences this abundance of choice in the same way - it is differentially constructed and experienced (Ben-Porath, 2010; Clarke, 2010; Rosenthal, 2005; Sen, 1977; Sen, 2011). In this way, differences in individuals' social realities have a significant impact not only on the choices they have on offer, but also their ability to choose between them. This, in turn, can contribute to reproducing and compounding existing social divisions and inequalities (Butler & Watt, 2007; Hurst, 2004). Drawing on the previous discussion, it is worth reiterating a key conceptual difference between choice and decision-making, that is, choice as an abstract capability (a right, privilege, ethic, or even obligation) and choice in terms of the external reality of the options on offer within the space in which choice is exercised. Drawing on the literature, one way to advance this idea is through difference between 'having choice' and 'making choice' (Ogden et al., 2008, 2009). Framed in this way, choice involves *having* options to choose from, as well as the process of *making* choices. Ben-Porath argues that 'having choice' is also dependent upon having opportunities. This suggests that the space(s) in which choice is exercised must be queried in order to explore not only

how individuals choose (*making*), but also what choices are actually available to them (*having*). As Hortensio says in Shakespeare's *The Taming of the Shrew*, "there's small choice in rotten apples" (Shakespeare & Gill, 2012).

It is clear that the space in which choice is exercised is important to examine if we are to understand how choice operates and is governed, both in terms of 'having' and 'making' choice. Woolgar and Neyland develop this idea more broadly, examining how space accomplishes governance (2013, pp. 166-193). Paying particular attention to issues of ontology, they explore the airport as a space of governance, a space that functions through the deployment and arrangement of both human and non-human entities (people, objects, architecture): "it is a space within which signs are erected, barriers put in place, means to survey the population of objects and their owners/users are established, and attempts made to manage errant people/objects" (Woolgar & Neyland, 2013, p. 167). This is discussed further in Section 2.3.

In thinking about the relationship between 'choice' and space, recent studies have examined the ways in which choice can be 'nudged' through 'choice architecture' (Thaler & Sunstein, 2009; John, 2011), thereby subtly influencing people to change their behaviour. Choice architecture is similar to the concept of 'framing' (Callon, 1998, pp. 244-269; Kahneman & Tversky, 2000), whereby what is chosen often depends upon the way choices are presented (Johnson et al., 2012; Nease, Frazee, Zarin, & Miller, 2013; Watkins, 2010). For example, a patient's choice of hospital can be influenced through the way information is designed and presented by 'hospital scorecards' (Boyce, O'Neill, & Staff, 2011). Similarly, choice can be nudged through marketing techniques such as changing the location and availability of food items to influence shoppers to make particular choices (Katarzyna & Jane, 2012). It is noted that 'nudging' carries complex ethical considerations, with some arguing that it undermines personal autonomy and freedom (Cohen, 2013; Wilkinson, 2013), although this claim is not without dispute (see Miller & Gelinas, 2013). Indeed, some authors such as Greenfield have gone so far as to argue that personal choice is a 'myth' (Greenfield, 2011). Although these issues are valid and important, the key point for the present study is that the space in which choice is exercised is not neutral, but can be *shaped and governed*.

In thinking about choice in contemporary society, choice has become a key organising principle of public services and public policy in many countries, including - but not limited to - Australia (Campbell, Proctor, & Sherington, 2009; Haigh, 2012); the U.K. (6, 2003; Newman & Kuhlmann,

2007; Taylor-Gooby, 1998); Germany (Blank, 2009); the United States (Bownds, 2003); and Sweden (Blomqvist, 2004). Choice is framed in these discourses in terms of 'consumer' and 'customer' choice, whereby individuals are constructed as consumers of public services. Moreover, choice has been installed into public service discourse to improve cost-effectiveness and create efficiency through competition (Hunter, 2009; Le Grand, 2007), to accord with neoliberal approaches within New Public Management (Hasenfeld & Garrow, 2012) and market-based reform (Clarke et al., 2008). The notion of 'citizen rights' and 'empowerment' has been influential in bringing about choice-based approaches to public policy (Brown & King, 2005; Rostgaard, 2006), although the extent to which public service users have actually been 'empowered' is debated (Barnes & Prior, 1995; Bownds, 2003; Hunter, 2009).

2.2 Technology and society: critical perspectives

The notion of technology is central to this study, yet so far in this chapter little consideration has been given to what technology is and how it relates to individuals and society. In order to proceed with conceptualising and examining the relationship between choice and web technology, it is necessary to provide a foundation for how technology is conceptualised and reasoned about in this study. This will help to weave a path between 'extreme' perspectives of technology, namely, the poles of technological determinism and social constructivism. Moreover, as noted in the previous chapter, until recently sociology has not tended to include objects and technological artefacts as 'actors' within the social world. As Lindemann argues, "the field of sociological research is [traditionally] restricted, for example, to the social systems constituted by social actions of living human beings (Parsons), to the symbols developed in human interactions (Mead), or to the actions within human social relationships, which constitute social forms (Weber)" (2005, p. 69). This section challenges this ideas, providing a foundation to mount a coherent and defensible argument regarding how choice is shaped through web technologies.

There is now an extensive social theory of technology literature that is fundamentally important to the present study. A common theme of this literature is the notion that technology - both non-digital and digital - does not merely consist of 'neutral' tools that lie waiting to be imbued with purpose and action by their human creators. Rather, technologies are also understood as inherently moral, ethical

and political, embodying particular knowledge structures, beliefs and rationalities, ways of being, and institutional arrangements. There is a dialectical relationship between technology and society: technology both shapes and is shaped by individuals and society. As Feenberg argues, "modern technology is no more neutral than medieval cathedrals or the Great Wall of China; it embodies the values of a particular industrial civilisation, especially those of elites that rest their claims to hegemony on technical mastery" (Feenberg, 1991, pp. v). This perspective largely contrasts with earlier perspectives of technology, notably the philosophy of technology espoused by Heidegger (1977). Heidegger's perspective tends to interpret technology as having an essential quality that reveals the world through processes of 'enframing'. In this perspective, humans are conceptualised as resources that stand in reserve as the world is inevitably revealed through technologies. Yet, as Kirkpatrick argues, social perspectives tend to eschew the notion that technologies are the destiny of modern society in favour of the non-linear or contingent aspects of technology that both shape and are shaped by human agency (Kirkpatrick, 2008). Indeed, as Grint and Woolgar argue, social theories of technology offer an 'anti-essentialist' framework that recognises technological artefacts as texts that are embedded within, and at the same time constitutive of, the context in which they are interpreted (1997, pp. 32-36).

In recent decades, extensive scholarship around technology and non-human objects has developed in STS. As I discuss in this section, central to these literatures are themes relating to ontology and politics, that is, the problematisation and study of technology as inextricably bound up in the social world and thus imbued with the political and ethical dimensions that characterise social relations. As Winner writes, "technologies are not merely aids to human activity, but also powerful forces acting to reshape that activity and its meaning" (Winner 1986, p. 6). Technologies are 'works in progress', entangled within socio-technical processes of construction and mediation. In this section I review some of the key ideas and perspectives in this literature, providing a background and position for the study of technology in this thesis. Having established this, I will turn attention more specifically to the ontological and political dimensions of web-based technologies and web spaces.

2.2.1 The sociotechnical and socio-material: ontology, politics, agency

The interdependence of social and technical systems has been conceptualised under the rubric of the 'sociotechnical' since at least the 1950s (Trist & Bamforth, 1951), and has extended well beyond the remit of business and management theory. In STS and sociology, a number of interrelated perspectives and theories have developed over the last several decades. These provide further development of the notion of the sociotechnical, and have been viewed as a response to the predominance of the rationalist/functionalist approach that characterised earlier research (Kaghan & Bowker, 2001). First, the notion of 'technological intentionality' in Ihde's work explores how technologies provide frameworks for action that "form intentionalities and inclinations within which use-patterns take dominant shape" (Ihde, 1990, p. 141). Later scholarship has developed this idea to understand how technological objects and tools are not only acted upon by humans, but also how the human body is acted upon by technology (Ihde, 2002). In this way, the notion of subject and object begins to break down when bodies and technologies come together, and brings to bear the politics embedded within socio-technical phenomena. In this way, technologies expose bodies to multiple identities and relations of self with self, that are not simply reducible to dualistic notions such as subject and object. Mol's notion of 'socio-materiality' provides a complementary perspective, expressing the way in which the social and material recursively co-constitute each other (Mol, 2002).

Haraway's conception of the 'cyborg' provides an important perspective on the 'multi-stable' boundaries of human and machine. In her influential paper, 'A Cyborg Manifesto', Haraway uses the concept of the 'cyborg' to undertake a feminist critique of entrenched essentialisms and dualisms in Western discourse, including that of human and machine: "High-tech culture challenges these dualisms in intriguing ways. It is not clear who makes and who is made in the relation between human and machine" (Haraway, 1991, p. 321). Haraway's work contribute greatly to fostering a space in which non-binary conceptions of subjectivity could be explored in the context of gender, self-identity, and, importantly for the present study, humans and technology. Yet, for Verbeek, the notion of the cyborg reflects the manner in which humans and technologies do not merely have complex relationships, but actually co-constitute one another (Verbeek, 2005). In developing this idea, Verbeek draws on and develops Haraway and others' concept of the cyborg, as well as Ihde's notion of technological intentionality to set forth the concept of 'cyborg intentionality' (Verbeek, 2008). In this way, he extends our understanding of the concept of intentionality as it relates to

human-technological 'cyborg' relations in primarily two ways. First, the notion of 'hybrid intentionality' augments Ihde and others' concept of 'mediated intentionality' by attending to the way in which humans and technology *merge* rather than interact (Verbeek, 2008, p. 388). This, Verbeek argues, constitutes a form of intentionality that is "beyond the human" (2008, p. 391), a co-constitution of the human and the technological. Second, he argues that there is also a "composite intentionality" in which there is an interplay between human intentionality and the intentionality of the technologies themselves (2008, p. 388).

Applying these ideas to web technologies and 'choice', consider, for example, a person who wants to find a good Vietnamese restaurant within walking distance that also has gluten-free options. Like many people, this person carries their web-enabled smartphone at all times, and they quickly refer to the Yelp website in order to help them choose a restaurant. Yelp is a site that enables people to compare local businesses based on a range of factors including user ratings and reviews. The person discovers that there are two suitable restaurants, but both have very poor ratings ('1 star' and '1.5 star' respectively). At the same time, the user sees a recommendation for a nearby Italian restaurant with gluten-free options that has a '5 star' rating. Although Vietnamese food is their preference, they 'take a gamble' and choose to eat at the Italian restaurant. While they are at the restaurant, they receive a notification from Yelp asking if they want to 'check in' at the location and submit a review. They accept it, and leave a '5 star' rating for the restaurant, including several photos of the dishes they ordered. What we observe in this example is the interplay between the intentions of the user (choosing a restaurant to suit personal tastes and requirements), and the intentions of the designers of Yelp (ensuring the user is satisfied and likely to return, and also encouraging and facilitating them to engage as a contributor). The interaction between user and the Yelp web space is co-constitutive and evokes a kind of composite intentionality - both the user and the website are not left unchanged by their interactions (for example, the user ended up 'freely choosing' Italian food instead of Vietnamese, and the Yelp website now has one more review along with other data). Something emerges from the interaction between human and machine that is not reducible to either one.

Social perspectives of technology have also been developed extensively under the heading of Actor-Network Theory (ANT), notably by Latour, Law, and Callon. A core perspective of ANT is that the ever-changing complex assemblages of human and non-human actors both shape and are shaped by social actions and interests (Latour, 1991 p. 107). Non-human objects are to be considered

as actors with agency, that form assemblages with humans and other objects. For instance, Latour's critique of the National Rifle Association's meme, "Guns Don't Kill People, People Do" illustrates and problematises the subject-object dichotomy in studies of humans and technology. In rejecting a binary separation between guns and people, Latour argues that it is "neither people nor guns that kill. Responsibility for action must be shared among the various actants" (1994, p. 34). In Latour's perspective, a third 'hybrid' actor, or 'actant', emerges from the actor-network formed through the relationship of the gun and the person, a kind of citizen-gun, or gun-citizen (Latour, 1994, p. 32). As a result, he argues that "you are different with a gun in hand; the gun is different with you holding it. You are another subject because you hold the gun; the gun is another object because it has entered into a relationship with you" (Latour, 1994, p. 33).

Alongside ANT, John Law's notion of 'fractionalities' provides a complementary theoretical direction that eschews the ontological dualism of singularity versus multiplicity. In doing so, this opens up a space to recognise that while there is no single or fixed reality of how technologies are constructed and maintained, at the same time there is clearly a limit to the notion of ever-expanding multiple realities that co-exist without restraint (Law, 2004). In Law's telling, fractional coherence is "*about drawing things together without centering them*" (2004, p. 2, emphasis original). Reading against the duality of singularity/multiplicity, he construes technologies and other objects as having partial, tentative realities that both shape and are shaped by the actors that are assembled and connected together, including our own efforts to render them coherent. This draws on and expands the work of scholars such as Mol, who highlight the 'ontological politics' involved in establishing what exists and how it does so (see Mol, 1999). For the present study, the notion of fractionality enables us to move away from any notion that websites, and web technologies in the broad sense, are inherently fixed or singular actors. This recognises that while there is no single or fixed reality of how websites are constructed and maintained, at the same time there is clearly a limit to the notion of ever-expanding multiple realities that co-exist without restraint (Law, 2004).

Reading against the duality of singularity/multiplicity, we can take up the position afforded by fractionalities to position websites as partial, tentative realities that both shape and are shaped by the actants (human and non-human) that are assembled and connected together in the socio-technical space. This provides an ontology of web technology that seeks to account for the reality of what a website is and the work involved in maintaining the space. In this way, websites, as bounded and

stable entities, are coherent but only in a fractional capacity alongside our efforts to make them coherent. For this study, the notion of fractional coherence enables us to cohere and examine how choice and technologies intersect in web spaces. Websites are not perfectly singular entities and nor are they infinitely multiple. There are "limits to the conditions of possibility" (Law 2002, p. 8) for how choice is constructed within web spaces. This is an important point for addressing the aims of this thesis because I wish to examine how choice is structured through the design features and architecture of websites. This requires work to account for, and render coherent, the assemblages of human and non-human elements that come together in the web space. One might argue that there appears to be an endless multitude of ways that 'choice' is constructed and governed through the web. Yet, as I will show in the second part of this chapter, there appear to be patterns and order to the way in which this is achieved, if we are permitted to perform boundary work and attempt to draw together some coherence to this phenomenon. The approach I am taking in this thesis is to impute a logic of choice to web spaces that have been variously characterised as 'evaluation' sites, 'ratings and reviews' sites, and 'comparisons' sites, among others. This points towards the development of a conceptual framework for studying how choice is constructed and governed through the web, which is the focus of the second half of this chapter.

2.2.2 Technological affordances

The theoretical perspectives presented so far have provided a necessary background to proceed critically in positioning the reality and role of technology in this study. With this in mind, I will now turn attention to the notion of affordances and its relevance for the study. Later in this section I will link the notion of affordances theoretically to Foucaultian social theory and key STS scholarship, setting the stage for the conceptual framework introduced in the second part of this chapter.

In his seminal work on the theory of affordances, Gibson argues that the tools and objects that people encounter in everyday life present particular sets of possibilities for how they may be used (Gibson, 1977; Gibson, 1979). He argues that these possibilities of action can be conceptualised as the 'affordances' that objects have for action. Drawing on Latour's example of guns in the previous section, it is clear that a gun has a different set of affordances than, for example, a hammer, or a bouquet of flowers. Indeed, in positioning political agency in technological artefacts, it can be

observed that the affordances of technologies enables the 'delegation' of action, for example, a speed bump acting as a 'sleeping policeman' by making drivers slow down (Callon & Latour, 1992, p. 361). As the previous section argued, technology both shapes and is shaped by society, yet the notion of affordances enables us to examine the ways that relatively stable technologies both facilitate and constrain action. Thus, affordances directs attention towards how *technology shapes action*, while also taking care not to fall into technological determinism.

Hutchby (2001) develops the notion of 'technological affordances' in order to explore a perspective of technology that he situates between the poles of social constructivism and realism. Engaging critically with the notion of technology-as-text (Woolgar, 1990; Grint & Woolgar, 1997), Hutchby argues that the affordances of technologies "constrain the ways that they can be possible 'written' or 'read"' (2001, p. 447), that is, technologies do not all have the same set of possible interpretations. In this way, technologies have affordances that shape the types of actions that users are able to make, but also suggest possibilities for action. As Latour argues, technological affordances are "at once permission and promise" (2002, p. 250). Indeed, Latour argues that the concept of technological affordances is useful because it attends to the way in which technologies and objects "authorize, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid, and so on" (2005, p. 72, and footnotes). To summarise, two key components of Hutchby's notion of technological affordances are: (1) objects may have very different affordances for different actors; and (2) there are also limits to such affordances: "while a tree offers an enormous range of affordances for a vast variety of species, there are things a river can afford which the tree cannot, and vice versa" (Hutchby, 2001, p. 447). Recently, the notion of affordances has been used to study a range of digital technologies, including ICTs (Best, 2009), websites (Lund & Ole Pors, 2012; Ranker, 2015) and social media (Kaun & Stiernstedt, 2015; Springer, 2015; Sauter, 2013), and even online gaming (Andreas et al., 2010; Idris & Wang, 2009; Warschauer et al., 2012). The empirical findings of these studies provide evidence of the 'shaping' effect of technologies, which simultaneously limits and facilitates action in different ways. For web and social media, the inclusion or exclusion of particular features or design elements shapes the affordances of the space. For instance, in their study of how Facebook shapes temporal experience, Kaun et al. (2015) show how the introduction of the 'timeline' feature enabled users and administrators to construct a summarised history (e.g., of a profile or a page), which in turn structures the temporal experience of 'remembering' on Facebook.

To date, little research has investigated the affordances of web-based ratings, reviews, and ranking schemes. Notably, Pollock has empirically examined the affordances of ranking devices in a business context, such as industry analysis firms, arguing that "these objects do more than simply facilitate communication of a judgment calculated prior to its incorporation in a material form" (2012, p. 92). In this way, ranking devices afford a particular kind of ranking that not only shapes the kinds of reviews produced, but also requires work in order to realise such affordances. For example, Pollock (2012) shows how the evolution of the 'magic quadrant' device (a two-dimensional graph used by industry analysis firms to visually rank IT vendors) requires an increasing amount of work to get it approved for release and also meet the demands and expectations of consumers. Pollock discusses how the 'dots' that represent where individual vendors are ranked on the magic quadrant were the subject of much debate and struggle in order to make the magic quadrant visualisation aesthetically perfect. In this way, Pollock highlights the work required to determine the right amount of dots (not too many, not too few), the ideal sizing and placement for dots, the categories that each quadrant represents, and so on (2012, pp. 99-105). This work was conducted to bring about the "beautiful picture" of the magic quadrant, whereby an ideal aesthetic is achieved. Yet, as Pollock argues, this "beautiful picture" does not merely take a snapshot of a "perfect market" (the IT vendor industry), but in fact *performs* and changes the domain that it purports to reflect, drawing on the scholarship of Michel Callon and Donald Mackenzie, among others. This accords with Espeland and Sauder's conclusion, suggesting that "rankings evoke self-fulfilling prophecies (2007, p.33). Hence, in Pollock's study, the ideal number of dots (20 to 25) is not *all the vendors*, but instead it is all the vendors that could be fitted within the socio-material constraints of the magic quadrant ranking device. One of the key conclusions that Pollock makes is that the two-dimensional space of the ranking device needed to be 'affordized' in order to realise its affordances for not only capturing but also *intervening* in a changing market, whereby vendors change their behaviour recursively in response to the devices that rank and evaluate them. This suggests that the affordances of these devices and tools are much more complex than they seem, an idea that is explored throughout this thesis and particularly in Chapter Six.

2.3 Governing through technology, governing through space

In the introduction to this thesis, I drew attention to Ziewitz's study of web-based feedback schemes, which he conceptualised as having a 'logic of evaluation'. Moreover, Ziewitz analysed these evaluation schemes *as governance* using a Neo-Foucaultian approach. This is an important perspective that suggests important lines of connection between ToC, Foucaultian theory, and key ideas in STS. In this section I would like to draw upon, but also re-orient, this perspective to consider the relationship between *choice* and governance, leading to a consideration of governance and ICTs, and more particularly web technologies. This will provide a foundation for the study whereby I examine a central idea, that is, how choice is governed socio-technically through the web.

The body of literature often described under the heading of Neo-Foucaultian or post-Foucaultian governmentality draws upon and develops the notion of 'government' in the work of Michel Foucault. For Foucault, the concept of government

> ... must be allowed the very broad meaning which it had in the sixteenth century. 'Government' did not refer only to political structures or to the management of states; rather, it designated the way in which the conduct of individuals or of groups might be directed: the government of children, of souls, of communities, of families, of the sick ... To govern, in this sense, is to structure the possible field of action of others (Foucault, 1982a, p. 341).

In reasoning about government, Foucault coined the term 'governmentality', formulating a neologism of the words government and mentality. Governmentality is often concisely defined as 'the conduct of conduct' and is regarded to embody a theoretical approach to understanding the ways in which knowledge, practices and technologies shape human conduct towards particular goals or rationalities (Dean, 2010). Neo-Foucaultian governmentality has developed and elaborated these ideas, headlined by scholars such as Dean, Rose, Hindess, Burchell, Miller, Gordon, Lemke, and others. A key perspective is that most contemporary modes of government do not operate simply through coercion, restraint or rewards, but through processes of subjectification whereby subjects come to internalise certain subject positions, and in doing so enact idealised compliance. Processes of subjectification occur amidst complex assemblages of discursive, material, and socio-technical

elements. Governmentality provides an 'analytics of power' that goes beyond unified or totalising conceptions of power and control (Foucault, 1981, p. 82). The focus is not on centralised forms of power, but rather the "organised practices through which we are governed and through which we govern ourselves" (Dean, 2010, p. 28).

There is an important relationship between the concepts of choice, government, and space in Foucault's and later scholarship. In his lectures at the Collège de France, Foucault defines and studies the notion of 'homo economicus' introduced earlier in this chapter (Section 2.1.1). In doing so, he argues that homo economicus "appears precisely as someone manageable, someone who responds systematically to systematic modifications artificially introduced into the environment. Homo economicus is someone who is eminently governable" (Foucault & Senellart, 2008, p. 270). A key theme in this analysis is less of a focus on 'freedom' (the isolated subject who must be left alone by, or is tangential to, government), and more of a focus upon 'choice', that is, the subject that is governable through regulating the field of action in which choice is made thinkable and possible. Thus, government is characterised as having an active and productive operation of power, rather than characterised as simply oppressive or negative. Foucault argues that English empiricism (by which he primarily means economic analysis[1]) introduces "a subject who is not so much defined by his freedom ... but who appears in the form of a subject of individual choices which are both irreducible and non-transferable" (2008, p. 270).

This idea is taken up in later scholarship that positions choice as an irreducible facet of the relations of self with self (Massumi, 2015, pp. 9-10; Deleuze, 1988, pp. 78-101). Moreover, Foucault argues that there is a key relationship between the choosing subject and the notion of 'interest', that is, "a subject of interest, by which I mean a source of interest, the starting point of an interest, or the site of a mechanism of interests" (Foucault & Senellart, 2008, p. 273). For Foucault, the interest(s) of the subject becomes the interest(s) of government: homo economicus becomes the correlate of a governmentality that manufactures and shapes the environment and variables in which 'choice' is exercised. As I discuss later in this section, choice is rarely exercised in a neutral or 'free' spaces, but in *highly regulated and managed spaces*, made up out of a heterogeneous assemblage of technical, discursive, symbolic, and material components that accomplish governance. Indeed, the definition of government as the 'conduct of conduct' expresses how choice is structured and shaped through the

[1] As Betta writes, Foucault did not expand on this form of empiricism, although his later lectures appear to include within its remit John Locke, David Hume, Adam Smith, and later John Stuart-Mill (2016, p. 31). Samuli argues that the term 'English empiricism' is also referred to as 'English radicalism' (2014, p. 55).

space in which it is exercised and experienced, but is never *determined* by it (to do so would negate choice).

In the decades following Foucault's lectures at the Collège de France, the concept of choice has undergone further developments and recognition within the broad field of Foucaultian theory. A key scholar, Rose, offers the following overview:

> Citizens shape their lives through the choices they make about family, work, leisure, lifestyle, and personality and its expression. Government works by 'acting at a distance' upon these choices, forging a symmetry between the attempts of individuals to make life worthwhile for themselves, and the political values of consumption, profitability, efficiency, and social order (Rose, 1999b, pp. 10-11).

An important argument within Rose's work is that individuals are not only 'free to choose' but in fact are forced to choose in order to be 'free' (Rose, 1999b). As discussed previously, (Section 2.1.2), individuals are increasingly constructed as consumers, and in these capacities are linked up with the advanced liberal project of 'freedom through choice'. As Shankar, Cherrier and Canniford suggest, "The liberal project thus manifests itself by encouraging people to 'self-manage' through rational choices that they make for themselves, organising these choices around the operations of markets and conflating this choice to freedom" (2006, p. 1020). This is not to suggest that choice is 'manipulated' or determined by some totalising force, but rather that the field of choice of individuals can be structured in such a way as to 'forge a symmetry' between the government of others and the government of self. This is an important point for this thesis because it establishes how the *spaces* in which choice is exercised are not neutral.

As discussed previously, Woolgar and Neyland (2013) develop the idea of 'spaces of governance' to examine more broadly how space accomplishes 'mundane governance'. They use the example of an airport[2], and more specifically the airport terminal[3], which "comprises a massive seething throng of *entities*-including, notably, a wide range of objects and their people-passing through a relatively limited space in a definite period of time" (Woolgar & Neyland, 2013, p. 167, emphasis original). In

[2] As the authors note, the identity of the airport was kept confidential (see Woolgar & Neyland, 2013, p. 166).

[3] The authors refer to the 'terminal' as the specific building, whilst the airport is a broader set of buildings and infrastructure (see Woolgar & Neyland, 2013, p. 167)

terminal space, a multiplicity of interests and capacities converge, link up, and are negotiated in order to "accomplish the airport" (Woolgar & Neyland, 2013, p. 192). Governing terminal space is not simply reducible to boarding passengers onto planes at the correct time, but relates to a complex of events and experiences in the airport that include shopping and commerce, security, health and safety, and managing a seemingly endless set of relations of accountability between managers, engineers, the board, airline companies, and architects (Woolgar & Neyland, 2013, p. 191-192).

Importantly, the *design* of the terminal space and the materiality of the human and *non-human* entities assembled in it are not tangential, but central to accomplishing governance. Thus, the terminal architecture and design features (e.g., levels, zones, furniture, colours, arrangement of shops) and wayfinding technologies (e.g., TV screens, signs, and announcement speakers), all have a key role to play in the everyday functioning of the airport: they are all important participants in the 'accountability relations' that are contingently accomplished (Neyland, 2006). There is a kind of "ontological enactment" that occurs through the socio-technicality of the terminal, which is not just about managing people, but governing through the capacities or *affordances* (see previous section) of the space and the objects assembled within it. The ongoing actions undertaken to design and arrange the space are performed with 'particular kinds of accountability relation[s] in mind' (Neyland and Woolgar, 2002, p. 263). A key point that Woolgar and Neyland (2013) identify is the ongoing negotiation - the everyday struggles and successes - involved in ensuring that the space and the objects are amenable to the interests and capacities of all entities involved (human and non-human). For example, the London airport architecture won awards for the engineers and designers, but it also imposed constraints for managers who "constantly sought ways to enhance efficient passenger movement through the space" but not in any way that would detract from the architecture (Woolgar & Neyland, 2013, p. 173). Similarly, the movement of passengers in the terminal is highly governed through spatiality and materiality, for example, encouraging swift movement through security checkpoints, but slow movement through retail areas, through the strategic arrangement and/or absence/presence of objects, for example, furniture. For this study, it is clear that the design and architecture of spaces has an important, and to date somewhat under-appreciated, role in governance. As Neyland writes, "objects (rather than people) as matters of concern have hitherto been somewhat neglected" (2008, p. 21).

2.4 Choice and web technologies

In this section I would like to direct the discussion back to a consideration of the relationship between 'choice' and the web, which is the general focus of this thesis. This discussion builds towards the final section of this chapter, where I set forth a conceptual approach to understanding how choice is shaped through the web.

To begin with, a vast body of research largely located in e-commerce, marketing and information systems provides insight into how Internet, and more specifically, web, technologies present and structure the decision-making of users (Gudigantala, Song, & Jones, 2011; Gudigantala, Song, & Jones, 2008; Lin, Yu, & Hsu, 2010; Song, Jones, & Gudigantala, 2007; Wang & Benbasat, 2009). In these bodies of literature, the conceptual focus is strongly directed towards 'decision-making' tools rather than engaging with the notion of 'choice'. As I have argued previously, this means that such studies tend to focus on the outcome of a specific decision-making process, and the patterns and variables that are associated with it. A plethora of studies have emerged in business and marketing literature that examine how websites can influence peoples' decisions through ratings (Lagu, Hannon, Rothberg, & Lindenauer, 2010; Lelis & Howes, 2011) and reviews (Chatterjee, 2001; Chevalier & Mayzlin, 2006; Duan, Gu, & Whinston, 2008). Studies also indicate that web technologies are becoming increasingly sophisticated in their ability to influence consumer behaviour (Gretzel & Fesenmaier, 2006; Uchyigit, & Ma, 2008; Yoo, Gretzel, & Zanker, 2013). Indeed, Pang and Lee (2008), in their study of opinion-oriented information systems highlight how consumers are willing to pay from 20% to 99% more for a 5-star-rated item than a 4-star-rated item (the variance stems from what type of item or service is considered), and that 32% of users have provided a rating on a product, service, or person via an online ratings system. Similarly, in a survey of 1,480 users of the TripAdvisor website, Gretzel and Yoo find that online travel reviews influence the accommodation decisions of nearly half of all travellers (2008).

The notion of 'reputation systems' (Jøsang et al., 2007; Marti & Garcia-Molina, 2006; Resnick et al., 2000) or 'online reputation mechanisms' (Dellarocas, 2003) has concurrently developed within information systems research. As Delloracas argues, reputation mechanisms enable websites and online platforms to build trust between peers within online networks (e.g., buyers and sellers on eBay), by facilitating transactions through feedback mechanisms such as ratings (Delloracas, 2006).

Yoon (2015) develops this idea more broadly, arguing that reputation systems operate as a social, technological and cultural form of the digital reputation society, whereby web users become co-producers of spaces in which reputation plays an important role in ranking and rating schemes on the web. For Scott and Orlikowski, these kinds of web-based evaluation schemes constitute a socio-technical form of knowledge production (2012), meaning that users and the technical website infrastructure interact to generate knowledge about the options on offer, which both presupposes and produces reputation. Yet, as Ziewitz argues, the reputation or trust systems perspective tends to impute economic conceptions of information and social life, with an "engineering sensibility that focuses on technology as the locus of design and intervention" (2012, pp. 45-47). Ziewitz argues that this form of 'reputation economics' on the web evokes the image of humans as rational decision makers that use web-based tools to calculate optimal decisions in the face of information asymmetry (2012, p. 41). As discussed in the first section of this chapter, this understanding of choice as rational decision-making provides only a limited perspective. Further, Ziewitz argues that most studies of what he terms 'web-based reviews, ratings and rankings schemes' or simply 'feedback schemes' tend to focus on specific schemes, rather than overviews or comparative studies (2012, p. 39).

Indeed, very few studies to date have attempted to comparatively analyse or map 'decision-making' tools or ratings and reviews schemes on the web as a whole phenomenon. One noteworthy study, undertaken by Miles, Howes, and Davies (2000), involved the development of a framework to describe the design dimensions of e-commerce websites. Thirteen websites were analysed in that study to identify different approaches to aiding consumer decision-making (note: not construed as 'choice'). Importantly, one of the dimensions highlighted was 'comparison' — how products are made commensurable (e.g., comparing price or quality) — which reflects the choice-making process being configured through the website's functionality. However, the study is significantly out-dated and focuses on user interaction with e-commerce systems rather than how 'choice' operates through websites more broadly. More recently, in his study of web-based feedback schemes, Ziewitz offers a key perspective in his argument that there is a 'logic of evaluation' to web-based feedback schemes. In drawing together the multi-disciplinary perspectives and literature on reviews, rating, and ranking schemes, Ziewitz finds a 'strikingly coherent' theme, namely the practice and performance of evaluation. Moreover, he "respecifies" the notion of evaluation as *governance* by exploring how

such schemes are presented as "techno-scientific solutions to public problems[4]" (2012, p. 23). The notion of web-based evaluation tools as governance is an important idea that I take up and develop throughout this thesis (see Section 2.3).

2.5 Conceptualising 'Technologies of Choice'

This section introduces a conceptual framework that will be used to examine the central concept of this thesis, namely 'Technologies of Choice' (ToC). Firstly, I draw together studies from the literature to build the preliminary conceptualisation of ToC in this study. Following this, the next sub-sections set out the four 'dimensions' of the ToC conceptual framework. The first dimension, 'Having Choice', is derived from the crucial distinction between choice qua noun ('having' choice) and choice qua verb ('making' choice). Following this, the 'Facilitating Choice' dimension attends to the notion of choice qua 'making', and the tools and devices that are enrolled in making choices. The third dimension identifies another important element to choice: knowledge. This is conceptualised in terms of 'Knowledge Production'. The fourth dimension, 'Configuring Users', attends to how website users are positioned and constructed in relation to choice. The four dimensions of ToC provide over-arching conceptual categories that incorporate and cohere key theories, concepts, and studies from the literature. In Chapter Four, the conceptual framework is developed and refined further following an empirical study of websites.

Before proceeding, it is important to acknowledge similar concepts in the literature. It is clear that web-based technologies obtain a complex and pervasive role in shaping choice in techno-social hybrid societies. Although the impact and relationship between web technologies and choice has attracted very little sociological attention, recent studies have explored choice and ICTs more broadly, providing an important starting point to orientate and inform the present study's focus on web technologies. Kleine's 'Choice Framework' charts new territory at the nexus of choice and ICTs by conceptualising the varying 'degrees of empowerment' that forms of ICT offer for creating or inhibiting choice in terms of individual freedom within a development context (Kleine, 2010; Kleine, 2011). Kleine's Choice Framework deploys social theoretical perspectives that recognise the non-neutral, political

[4] 'Public problems', in the sense used by Ziewitz, include, for example, "information overload, improving health care, identifying trustworthy [sic], decentralised surveillance" (Ziewitz, 2012, p. 89).

nature of technology (see Section 2.2.1). This highlights the role that technologies have in shaping choice in different ways. Yet, Kleine queries the role of ICTs in creating choices in everyday life, rather than how ICTs structure choice. This is reflected as a rhetorical question in the title of her work, "Technologies of Choice?"[5] (Kleine, 2013). In this way, Kleine does not so much define a concept of 'Technologies of Choice', but instead asks the question of whether particular forms of ICT *increase or decrease choice* for individuals.

The notion of 'Technologies of Choice' is also loosely explored in Dotson's work as an object of inquiry, rather than a rhetorical question. Dotson argues "contemporary scholarship ... pays too little attention to the shaping power of technology on human choice-making" (Dotson, 2012, p. 326). Drawing on Borgmann, he terms 'technologies-of-choice' as any technology or device that promises or appears to liberate individuals to pursue the 'good life', such as central heating (Dotson, 2012, p. 331). However, Dotson then critiques this conception, arguing against technological liberalism's "illusory belief that one can become an encumbered self who makes 'free choices"' (Dotson, 2012, p. 335). In doing so, he illustrates how 'technologies-of-choice' are not neutral and do not simply extend the human will without distortion. Rather, such technologies have a performative function that shapes, and is shaped by, particular conceptions of 'free will' and imaginaries of the 'good life'. Technological devices "have the agency to direct the user into different kinds of practices and patterns of living" (Dotson, 2012, p. 331). For example, central heating enables individuals in a building to remain cozy, yet unlike hearth and wood stove heating, central heating does not involve the same type and degree of physical exercise (e.g., collecting and chopping wood) and does not constitute a social focus for the building (e.g., sitting nearby for warmth and taking turns stoking the fire). In this way, Dotson's technologies-of-choice are conceptualised as tools or objects that are enrolled in liberating individuals to choose freely and live the 'good life', but at the same time *shape choice*, and render individuals 'free' in different modes and capacities.

In this study I draw upon and contribute to the notion of Technologies of Choice (herein 'ToC') alluded to in recent literature. In doing so, I depart from, but also seek to develop, the existing literature in several key ways. First, while Kleine's work broadly focuses on whether forms of ICTs

[5]I developed the notion of Technologies of Choice before Kleine's book was released, and my use of this term differs significantly. Kleine does not use this term as a concept, but as a rhetorical question posed in the title of her book, i.e., "Technologies of Choice?". The focus of her work is the 'choice framework'. Kleine is asking whether certain broad kinds of ICTs (e.g., telecenters) increase or decrease choice (in terms of individual freedom) for people in a development context.

(e.g., tele-centres, information systems) *increase* or *decrease* 'choice' vis-à-vis Sen's capability approach, the focus of this thesis is on web technologies in relation to websites and web-enabled platforms. Moreover, this thesis focuses on *how* web technologies shape choice through their strategic deployment in online spaces that people visit in order to compare between and make decisions about goods and services. The concern is not about whether websites 'increase' or 'decrease' choice as Kleine has studied more broadly for ICTs, but instead to conceptualise, theorise, and empirically examine how choice is shaped through the design features and architecture of websites. This is not to argue that such websites or their construction is reducible or essential to 'choice', but rather that there appears to be a 'logic of choice' in operation, in some ways similar to the 'logic of evaluation' that Ziewitz identifies (see Section 2.4.1).

At a rudimentary level, we might firstly conceptualise ToC as *tools* that enable individuals to compare between options and make 'informed' decisions. As discussed in Chapter One, ToC are preliminarily defined as the design features and architecture of websites that enable users to navigate choice and compare between options to make decisions. At first glance, the affordances of ToC for users is that they seek to provide the ability to navigate through the landscape of choice in order to make decisions, essentially characterised as decision-making tools. For example: comparing between hotels on tripadvisor.com based on '5 star' ratings; comparing laptops on newegg.com based on popularity or price; browsing personalised customer recommendations on amazon.com; comparing reviews of local restaurants on yelp.com; or making choices about publicly-funded services, such as comparing Australian school performance (myschool.edu.au) or health and social care providers in the UK (nhs.uk/service-search). Thus in analysing such websites as simply affording users to make informed choices, the answer to Kleine's question 'Technologies of Choice?' would appear to be yes. In other words, these web-based ToC are used daily by millions of people in the experience and enactment of 'free choice', and the story ends there. However, Dotson (2012) initiates a further line of argument that can be drawn upon to examine how ToC not only 'decrease' or 'increase' choice, but also perform and shape it in particular ways. Choice is not something that exists a priori - it is actively made. This provokes a more sociologically attuned conceptualisation of ToC that examines not whether, but *how* web technologies construct and shape choice. In this way, we can begin to draw attention to, as Henman argues, the manner in which "we exercise our choices in governed spaces" (Henman, 2007, p. 171), an idea that is extended here to problematise and examine online

spaces. However, this is not to take the status and identity of such tools and technologies for granted (Ziewitz, 2012, p. 48), but instead attempt to draw together and cohere the conceptual space in which they occur.

In the online world, choice is not separate to, nor merely a function of, technology. Rather, choice itself has become something that can be engineered, shaped, calculated and governed in order to "structure the possible field of action of others" (Foucault, 1982b, p. 221). As web users we are no less "governed through our freedom" than in other domains of existence (Rose, 1999a, p. 62) and we exercise 'free choice' in online spaces where choice is shaped and governed through a range of factors, one of which is the design features and architecture of the space itself. In this way people who use ToC are not 'more' or 'less' free, but rather exercise freedom in different capacities. The affordances of ToC differ from one website to the next, depending upon what sorts of ToC are deployed. These online spaces are by nature highly constructed and thus configure 'choice' and 'choosers' in different ways through their various settings and functionalities. Henman argues that "this 'shaping' by entities [should] be interpreted in terms of facilitation and constraint" (Henman, 1996, p. 209), or which we might reason about as the affordances of the tools provided in such spaces.

In this way, there is clearly a conceptual link between the notion of technological affordances (Section 2.2.2) and governmentality as 'the conduct of conduct' (Section 2.3). This offers an additional perspective to the social shaping of technology that accords with other literatures in STS and sociology (Section 2.2.1). Indeed, this perspective also applies to Foucault's earlier work, which Dorrestijn suggests offers a philosophy of technology that aligns with the "technical mediation" perspective of technology espoused by STS scholars such as Latour, Ihde, and Verbeek. Technologies of power *mediate* and govern human conduct without the need for direct force or coercion. Yet, for Foucault's later work on ethics and subjectivation, Dorrestijn argues that a 'hybridisation' perspective of technology emerges: interactions and relations between humans and technology are not separate spheres of existence, but have a co-dependent ontology: they mutually shape one another. Humans fuse with and enter into hybrid relations with technologies, providing a means by which they ethically govern and fashion themselves.

The position advanced in this study is that choice is not *determined* by web technologies, but rather is shaped and governed socio-technically through, among other aspects, the way in which an individual is positioned within and interacts with the structure or architecture of the web space. Users

are governed through the affordances of the space in which choice is both experienced ('having choice') and enacted ('making choice'). Thus, in one sense, the deployment of ToC within a given web space can be understood as "interventions that maintain freedom of choice, that do not impose mandates or bans, but nonetheless incline people's choices in a particular direction" (Sunstein, 2015, p. 6). The conceptual framework discussed in the remainder of this chapter provides a 'taxonomy' or classification system of the structural, or 'architectural', dimensions of how choice is shaped through the deployment of ToC. In this respect, it is observed that web users are 'free' to navigate and interact within a given ToC website, that is, to enact 'free choice' - but at the same time, users are facilitated and constrained in different ways, depending on how the space is constructed.

Following this, we might consider ToC as an 'infrastructure of modernity' (Feenberg, Misa, & Brey, 2003) or, more specifically, an 'information infrastructure' (Bowker et al., 2010), providing a means to construct online spaces in which users are configured to experience and enact 'choice'. Unlike traditional notions of infrastructure as inert and neutral, perhaps even inconsequential, ToC appear to perform an important kind of knowledge work that requires "an alternative vision of infrastructure [that] may better take into account the social and organizational dimensions" (2010, p. 99). This is not to reduce ToC websites or their components to simply being 'about choice', but rather to impute a logic of choice that is highly relevant to understanding this web-based infrastructure. As Lampland and Star argue, "we have to listen to infrastructure and bring imagination to understanding its components and how they work" (2013, p. 13).

In commencing the process of 'listening to' the infrastructure of ToC, the next section sets out four initial dimensions of the ToC conceptual framework (Figure 2.1. Each of the four quadrants in Figure 2.1 represents a 'dimension' of ToC, providing four over-arching conceptual categories for understanding and examining how choice is shaped through the web. In the remainder of this chapter I will introduce and discuss each dimension in turn. In doing so, I will draw on, and extend, the previous discussion in this chapter. As discussed previously, in Chapter Four this conceptual framework is refined and elaborated through an empirical study of websites.

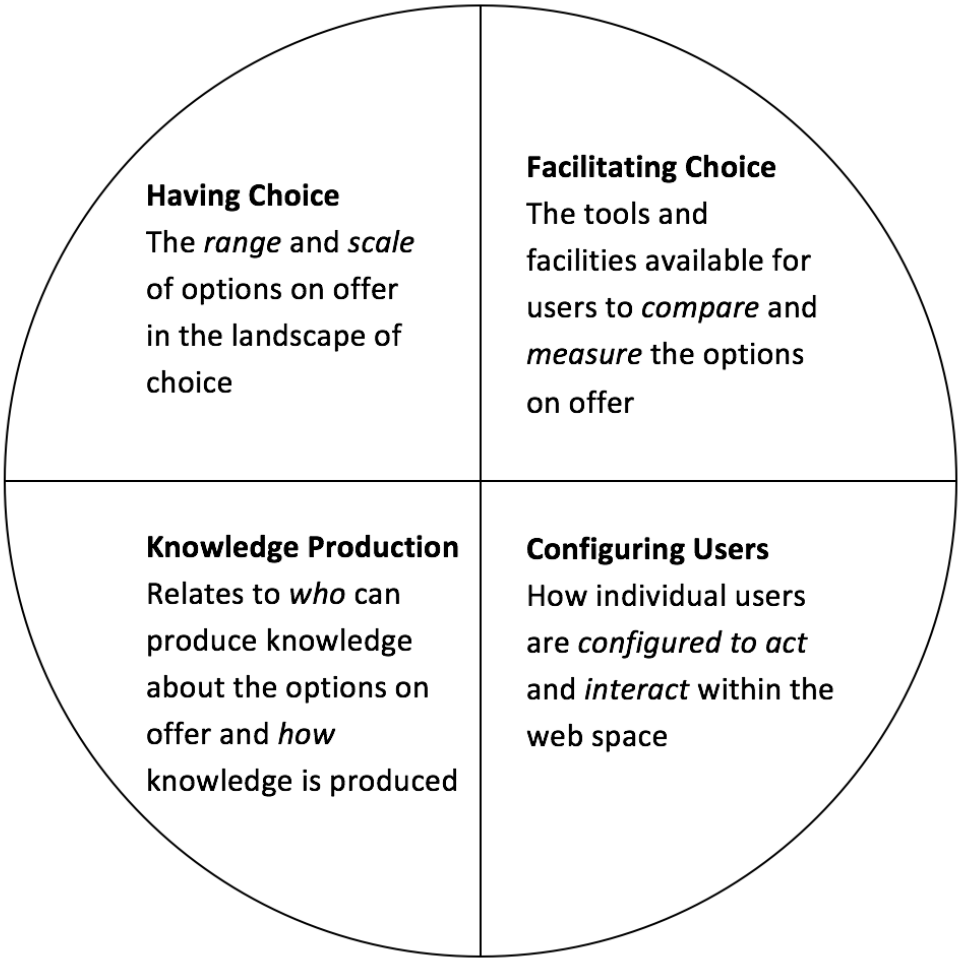


Figure 2.1: The initial ToC conceptual framework

2.5.1 Having Choice

The first dimension in the conceptual framework is 'Having Choice', which conceptualises choice in terms of 'having' options to choose between. As identified earlier in this chapter, individuals' social realities are shaped not only by what options are available, but also what options they are aware of and are in a position to act upon (see Section 2.1.1; Clarke, 2010). Indeed, there is a diverse sociological literature engaging with the structural aspects of choice, discussed in Section 2.1.2. However, the way in which online spaces structure what choices are on offer has not been explored in sociological literature. In conceptualising how websites structure what choice is on offer, I take as a conceptual point of departure the work of Barnett, Ogden, and Daniells. Although their work in this area examines choice in the context of the health care policy (not on the web), they provide an important conceptual key that I wish to develop further in relation to websites, namely: *having*

choice is not the same as *making choice* (Ogden et al., 2009). As Barnett et al. find: "In general people believed that having choice, as long as it is real, enhances a sense of autonomy and self efficacy" (2008, p. 612). This differentiation of 'having choice' as opposed to 'making choice' is drawn upon to conceptualise the first 'dimension' of the ToC conceptual framework, which has been termed 'Having Choice' in conceptual alignment with the work of Barnett, Ogden, and Daniells (see also Clarke, 2010).

The Internet has been regarded as the "medium of choice par excellence" (Norris, 2001, as cited in Kleine, 2013, p. 5). Indeed, Iyengar argues that the Internet extends the amount of choice on offer to an almost unimaginable scale, for example, "providing access to the 100,000 DVDs on Netflix.com, 24 million books (and millions of other products) on Amazon.com, and 15 million singles on Match.com" (2011, p. 188). Yet these observations do not fully consider how this online 'universe' of choice is often delimited within each website into a localised subset. The first dimension of ToC concerns a problematisation of what is actually on offer in a given website. It recognises that, conceptually, choice begins fundamentally with a universe of choice (the set of all things that could theoretically be compared between), but that what we think of as choice is most often delimited or sub-setted in some way. For example, comparethemarket.com.au provides users with "simple and easy-to-use tools that can help you make choices on [insurance] products that may suit your needs most". At first glance this appears unproblematic - one simply compares between insurance packages and selects the 'best' option. However, only in the 'fine print' does it specify that users are not comparing between *all* insurance packages on the market, but rather only those companies or brands that are signed under contract with the website. It is therefore evident that choice is, perhaps paradoxically, *produced* in online spaces through the *delimitation* of the options on offer. Web users are 'free to choose', but they are evidently free in particular ways, according to what is actually on offer. In this way, we can conceptualise ToC by "[beginning] to understand freedom not simply as an abstract ideal but as material, technical, practical, governmental" (Rose, 1999a, p. 63). These technical practices of sub-setting or delimiting choice within websites can be somewhat obscure (e.g., the contractually delimited 'market' of comparethemarket.com.au), but also relatively overt (e.g., comparing new cars on ford.com/compare, which only includes Ford models). In other cases delimitation might be almost non-existent, such as the apparently 'global' scale of products available through Amazon, for example. What is of concern is that choice depends upon what is on offer, and

the notion of 'Having Choice' provides a point of departure for conceptualising ToC.

2.5.2 Facilitating Choice

The second dimension of the conceptual framework, 'Facilitating Choice', turns attention to the 'making choice' side of the equation. This relates to the 'decision making' aspect of choice, as established in Section 2.1.1. Individuals typically draw upon a plethora of tools and resources in order to make informed decisions, including: 'word-of-mouth' recommendations (Oetting, 2009) and social influence (Brown & Hayes, 2008); expert authority (Rose, 1999a); risk calculators and models (Apreda, 2012; Vance, 2002); instinct or 'gut feeling' (Betsch & Haberstroh, 2005); and structured decision making information systems (Gillingham, 2011; Gupta, Forgionne, & Mora, 2006). Recent scholarship has identified and explored the role of reviews, ratings and rankings devices as fundamentally important tools for decision-making and choice. Pollock argues that "today, it appears that there are rankings to rate the quality and value of most things", and he offers an overview of the role of rankings across almost every conceivable area of social life (2012, p. 91). In recent years the advent of Web 2.0 (Han, 2011) has brought about a diverse ecology of web-based tools, often characterised as reviews and ratings systems or feedback schemes, that can be said to *facilitate choice* by making it easier for users to quickly and easily compare between alternate options. As discussed previously, Ziewitz (2012) frames these kinds of review, ratings and ranking schemes in terms of 'evaluation', and argues that "what makes this process possible is set of technologies that collect, process and distribute the results. The aim of the 'Facilitating Choice' dimension is to conceptualise and chart these tools that make comparison and evaluation possible through the web.

As noted in the previous discussion, the work of Miles et al. (2000) highlights the central importance of 'comparison' and 'commensurability' for understanding how decision-making is shaped through the design features and architecture of websites. In this way, ToC can be said to play a powerful role in *facilitating choice* by enabling people to compare between options in particular ways. The idiom 'comparing apples and oranges' harkens to this problem. Indeed, Kuhn reminds us: "lack of a common measure does not make comparison impossible. On the contrary, incommensurable magnitudes can be compared to any required degree of approximation" (Kuhn, 1982, p. 670). Hence, if it is possible to introduce or adapt a common language or standard — *or technology* — to compare two or more

dissimilar items, the problem of commensurability can be resolved to some degree of approximation. In other words, our decision making has been facilitated.

Scott and Orlikowski (2012) explore the role of commensurability through a case study of the TripAdvisor site, which enables users to find and compare between accommodation and travel options. They argue that user-generated ratings and reviews on Trip Advisor have reconfigured the hotel industry because these technologies enable comparisons between 'apples and oranges', namely accommodation options that are regarded as incommensurable in the travel industry. Scott and Orlikowski use the example of the ManorHouse (a hotel) and the PubInn (a pub), which are not seen as direct competitors in the industry because they are in different classes of accommodation, and indeed are listed in entirely separate industry guidebooks (2012, pp. 124). Yet, the authors argue that the review and rating system on Trip Advisor renders these options commensurable and in doing so "[intensifies] this material nullification of industry standards" (2012, p. 125). This accords with Gretzel and Yoo's empirical study of Trip Advisor users, whereby reviews were found to have an important role for influencing accommodation decisions (2008).

Ziewitz examines commensurability in this context in terms of a 'politics of commensuration' (2012, pp. 54-56), framing commensuration as a social process enacted through practical facilities of *classification and sorting*. Further, Scott and Orlikowski (2012) argue that commensuration is "the process of transforming disparate forms of value into homogeneous units, which allows information reduction, uncertainty absorption, and simplification of decision-making" (2012, p. 115). In reasoning about these 'forms of value' and 'units', the notion of 'facilitating choice' is informed and supplemented by work in the field of classification and standards. Bowker and Star provide a reference point: "to classify is human ... we all spend large parts of our days doing classification work, often tacitly, and we make up and use a range of ad hoc classifications to do so" (1999, p. 1). Further, they offer a compelling definition of classification:

> "*A classification is a spatial, temporal, or spatio-temporal segmentation of the world*. A 'classification system' is a set of boxes (metaphorical or literal) into which things can be put to then do some kind of work - bureaucratic or knowledge production" (Bowker and Star, 1996, p. 10, emphasis original).

The way in which categories order social processes is clearly important to the notion of 'facilitating choice' on the web. This provides an important perspective, following on from the previous discussion of commensuration. Ranking and rating tools on the web appear to have become a sort of 'information infrastructure' (Bowker et al., 2010) or 'digital infrastructure' (Ziewitz, 2012, p. 60), providing practical facilities to categorise the world, fast-becoming standardised tools that constitute "recipes for reality" (Busch, 2011). Yet, as Bowker and Star have argued, categories can become embedded and stabilised within standards and infrastructure, which may obfuscate the work that is required to render them operable and maintain them (1999; see also Star, 1991). This work is constitutive of a kind of 'practical politics' that involves negotiating and deciding what to render visible (and thus invisible) within a given system (Bowker and Star, 1996). The practical politics of classification frames how we represent the past and how events are sequenced in the present (Bowker and Star, 1996). Indeed, as Ziewitz suggests, drawing on Star and Griesemer's work, "classifications may be best understood as a form of boundary infrastructure that assembles a stable regime of boundary objects" (2012, p. 58). Lampland and Star link the notion of categories and standards by construing it as 'infrastructure', which they loosely define as "something that other things 'run on', things that are substrate to events and movements: railroads, highways, plumbing, electricity, and more recently, the *information superhighway*" (2009, p. 17, emphasis added). Lampland and Star suggest that we often think of 'good infrastructure' as universally beneficent, providing a silent background for other kinds of work. However, they argue that infrastructure "is part of human organisation and as problematic as any other", providing numerous examples of how infrastructure, as a fundamentally relational concept, can also poses hindrances, setbacks, and even catastrophic problems for different people and groups (2009, p. 17).

Lawrence Busch provides an important perspective on standards, arguing that standards are not only used to 'standardise', but perhaps more importantly to *differentiate*, which he terms 'standardised differentiation' (Busch, 2011, Ch. 3) He suggests that "what we prefer to think of as free choice is shot through with standards and regulations of multiple kinds" (2011, p. 6). He refers to these processes under the rubric of standardised differentiation, whereby goods and services are increasingly differentiated according to established (or indeed semi-established) standards and regulations. Indeed, Busch argues that differentiation has become more commonplace whilst the growth in standardisation has decreased, and that "projects of differentiation have gained greater

significance in organising social life" (2011, pp. 153-154). In the context of ToC, the notion of standardised differentiation augments the discussion of commensurability, standards, and classification by drawing attention to how practical processes of 'facilitating choice' through ranking, rating, and sorting, categorise things by differentiating them. Of course, as Busch and others have highlighted, this is not a new phenomenon. Busch cites as a key example the Sears Roebuck catalogue that was first issued in 1894, which "massively increased consumers' choices" by using standards to differentiate over 200,000 items (2011, p. 153). Importantly, although the price mechanism is clearly important for deciding which option to choose amongst different alternatives, Busch shows that other criteria are used to differentiate and render commensurable options, such as colour, brand, model, style. This suggests that ToC contribute to what Busch identifies as the plural nature of non-price competition in markets, by enabling users to differentiate between options within an overabundance of choice.

2.5.3 Knowledge Production

When confronted with many different options to choose between, how do we know which one is 'better'? Where does this knowledge come from and what forms does it take? As discussed in the previous section, information about options is embodied and reproduced through the attributes that are used to define, classify, and differentiate options in order to make comparison possible. A theme that emerges from the discussion in this section is 'knowledge production', which takes as a point of departure a problematisation of the epistemological dimensions of ratings, reviews, and rankings devices. This problematisation is the focus of the third dimension of the conceptual framework, namely 'Knowledge Production'. Indeed, Ziewitz positions such technologies as modes and intermediaries of knowledge production: "the questions raised here are important: what is it to regard these reviewing, rating and ranking schemes not as enforcement tools at the hands of managers and administrators, but as ways of organising knowledge practices? What politics are implicated in these activities?" (2012, p. 25).

There appears to be a 'shadow side' to the notion of 'facilitating choice' presented in the previous section, bringing to light multiple forms of empiricism that underpin and appear to stabilise these technologies. Porter (1996) argues that 'trust in numbers' is constitutive of a pursuit of objectivity

that intersects science and public life. Yet, as Hearn (2010) suggests, ratings and ranking systems may appear to be objective or "glossed as science", but the foundations of such assumptions appear unstable. Blank argues that reviews and ratings are important and pervasive tools for producing knowledge about choice in information-saturated societies (Blank, 2007). He suggests that a core problem of reviews is that of 'credibility'. Blank's work on the production of credibility through reviews systems reveals a two-fold empiricism: *connoisseurial reviews* by singular experts, and *procedural reviews* produced through tests and standardised procedures (Blank, 2007). A cursory examination of websites reveals that knowledge production through ToC varies significantly from one website to another, but also attends to another form of empiricism that derives from user-generated content. In the context of Web 2.0, this form of knowledge production is often referred to as 'crowdsourcing' (Hammon & Hippner, 2012) or 'the wisdom of crowds' (Surowiecki, 2004). For example, Amazon produces knowledge about products using crowd-sourced 5-star ratings, qualitative user reviews and sophisticated recommender systems. In contrast, the government-operated My School website produces knowledge about Australian schools using statistical technologies such as standardised literacy and numeracy tests (NAPLAN), combined with certain forms of expert knowledge. Thus, Amazon users experience choice within a landscape of knowledge that is co-produced by ordinary people as well as the website administrators. On the other hand, My School users do not have the ability to provide their opinion or experience of schools to the website because knowledge about schools is constituted solely by 'expert' statistical measures of performance (and brief textual descriptions of each school provided by the school executive or principal).

As discussed in the previous section, it is clear that classification and standards not only *presuppose knowledge* about the world but also *produce knowledge* through the practical facilities of sorting, order, classifying, and differentiating. The link between knowledge production and classification work is by no means new. In 'The Order of Things', Foucault examines the relationship between classification and knowledge of the natural world (Foucault, 1970, Ch. 5). He argues that the multiple systems of scientific classification that emerged and developed in Western 'natural sciences' share a common thread: "a knowledge of individuals can be acquired only from the continuous, ordered, and universal tabulation of all possible differences" (Foucault, 1970, p. 157). Thus, classifications play an important role in producing knowledge about phenomena by constantly

locating and re-locating them within a "general grid of differences" derived from an "analysis of representations" (Foucault, 1970, p. 158). In other words, the way we classify things both produces, and is produced by, particular systems of knowledge. In this way, Foucault suggests that the categories and words we use to describe the world are not inherently 'natural' or self-evident. Rather, they signify a fundamental arrangement of knowledge that is interwoven with the priorities, knowledge systems and socio-cultural values of a particular time and place. As Schirato et al. would have it: "For Foucault, systems of categorization don't just arrange content: they both naturalise a certain mediated version of the world, and simultaneously render anything else more or less unthinkable" (Schirato, Danaher, & Webb, 2012, p. 168). Woolgar and Neyland trace links in Foucault's work between classification, governance, and space, which constitute practices of knowing and ordering people and things (2013). They argue that "orderliness in Foucault's work has a clear focus on the classification of people and things into neat and separate spatial containers" (2013, p. 169).

On the web we see the relationship between knowledge and classification play out in various ways. For example, Mazda 626s are *better value* than BMW Roadsters (kbb.com); Trinity College is a *better performing school* than Woodlawn State High (myschool.edu.au); Sony laptops are *more popular* than Dell laptops (newegg.com). These categories are not politically neutral - as Lucy Suchman argues, categories have politics (1994). Seemingly mundane entities such as ratings and ranking systems on the web can be reevaluated as categorisation devices "of social control involving contests between others' claims to the territories inhabited by persons or activities and their own, internally administered forms of organization" (Suchman, 1994, p. 188). Moreover, the contested nature of knowledge production through ToC appears to generate controversy and dispute. A recent example is the health food ratings scandal in Australia. The Australian government launched a health food ratings website, healthstarrating.gov.au, in 2014. Ostensibly, the website is simply a space in which food is rated on a '5 star' likert scale based on its nutritional composition, enabling consumers to make healthier choices. However, the website was quickly taken down when it was revealed that there was a high level of politics associated with the food ratings, including serious conflicts of interest for government officials who were also lobbyists for the food industry (The Conversation, 2015).

2.5.4 Configuring Users

As discussed earlier in this chapter, individuals draw upon a range of tools in order to govern their conduct and shape their sense of self through the choices they make. A growing body of literature has explored web technologies as tools for the formation of self (Bakardjieva & Gaden, 2011; Sauter, 2013). Given the previous discussion of the co-constitutive shaping of humans and technology, the 'Configuring Users' dimension of the ToC conceptual framework draws in particular on Woolgar's work in order to conceptualise how users are constructed and positioned within ToC websites. In his seminal paper, 'Configuring The User: the case of usability trials', Woolgar describes how the process of developing a new model of microcomputer in a technology manufacturing company involved a "struggle to configure (that is, to define, enable and constrain) the user" (Woolgar, 1991, p. 69). Woolgar observes that the multi-disciplinary team of architects of the new model of microcomputer configure users in broadly two ways: first, by presupposing or 'defining' the user; and secondly by 'establishing parameters' that shape what actions the user-as-reader of the machine can take. At the same time, he argues that the usability trials conducted by the company reveal that interactions between users and machines espouses a kind of 'boundary work', whereby the identities or entities (machine / user) are not settled or established, but are in a constant process of evaluation and definition. When a user appears to be inadequately configured in relation to the machine, a complex process of boundary work is involved in order to determine whether, and how, the user is incorrectly reading the machine-as-text, or whether, and how, the text itself is indeed 'not working' in its configured relationship with the user (Woolgar, 1991, pp. 86-88).

The notion of 'configuring users' is useful because it affords an analysis of the construction of the individual, that is, how the design features and architecture of web spaces might configure users to act in particular ways, and at the same time presupposes how such websites should be used. Viewed in terms of a logic of choice, this suggests that users are configured as 'choosers' in particular ways, but also often as co-contributors of the landscape of choice presented through each web space. However, imputing a logic of choice to such websites should not detract from the way in which users are configured for other purposes, including generating capital through their data (Gehl, 2014), drawing on and engendering calculative practices to foster trust (Jeacle & Carter, 2011) and attracting and maintaining economies and informational flows of user attention (Huberman, 2013; Gerlitz & Helmond, 2013; Ciampaglia, Flammini, & Menczer, 2015). Indeed, Shen, Hu, & Ulmer

(2015) argue that reviewers act strategically and that the way that website configures the user affects whether, and to what extent, reviewers compete with each other for attention.

Building on the earlier discussion about the complex role of choice in contemporary society (Section 2.1.2), state-operated websites provide an interesting example of how users are configured by ToC to choose in particular ways. As Ben-Porath argues that "the state can grant various forms of freedom to choose, and it can frame and shape them in a variety of ways through social policies ... providing individuals, groups, and institutions with a particular landscape in which to make their choices" (Ben-Porath, 2010, p. 4). This suggests that government-operated ToC websites may have a role to play in configuring the user towards particular kinds of choice and subjectivities as calculative agents. Gobby's recent work argues that the Australian Government's My School website is technically limited in its capacity to facilitate neoliberal economic calculations involved in school choice: "choice-making agencies are not readily producible by the website" (2015, p. 9). In this way, the functionality and design of My School, interpreted in this study as ToC, does not afford users to make informed decisions or enact choice in the way that users might expect if they are using commercial websites that deploy ToC (e.g., Yelp or TripAdvisor). Indeed, studies have suggested that My School operates within a framework of "normalized neoliberal assumptions" that serves political imperatives rather than the needs and desires of citizens (Redden & Low, 2012, p. 35).

An important observation implicit to Gobby's study is that the design features and architecture of the My School website have a fundamental role to play in shaping choice and configuring users:

> "My School does not directly inform parents which schools are superior – there is, for instance, no *ranked list*. The website has avoided this, and it stops third parties from doing so through a Terms of Use agreement. My School instead expects users, who have varying levels of literacy, to interpret the voluminous data provided to them" (Gobby, 2015, p. 7, emphasis added).

Gobby's study is important in the context of 'configuring users' through websites. He argues that My School may be more fruitfully analysed as a technology of self-government, attempting to cultivate a calculated form of parental educational agency in users: "through technologies of My School, parents are 'schooled' into calculating using politically valued forms of calculation and reasoning (e.g., test

data)" (2015, p. 9). The atypical design of My School suggests that such government-operated ToC websites might not simply be about 'consumer choice'. Rather, it may obtain a more significant role as a technology of advanced liberal forms of governing (see O'Brien, 2014). This raises a deeper line of inquiry: is it possible that ToC not only presuppose the subject, but also produce types of subjects as well? To what extent might users of My School become 'schooled' into thinking about choice in particular ways, to become homo economicus, the calculable and eminently governable subject of advanced liberalism? As Bucher (2012) suggests more broadly in relation to algorithms in web applications, could it be the case that ToC not only algorithmically shape user practices and subjectivity, but also lead users to internalise their norms and priorities?

2.6 Conclusion

In this chapter I have argued that there is an important, and as yet relatively under-developed, relationship between choice and technology, which have collided with force on the contemporary web. In reviewing the literature, it is clear that choice is a complex, multi-dimensional concept that has attracted significant and sustained interest across disciplines. Choice is imbricated with freedom and is beneficial to a point, but too much of it is problematic, and we find that contemporary consumer societies have a problem of 'too much' choice across almost every conceivable aspect of existence. There is an important difference between 'having' choice and 'making' choice, and this distinction provides a powerful analytic for delineating the enactment versus the experience of choice.

Choice both shapes, and is shaped by, discursive, material, and technological actors. Individuals draw on a range of tools in the exercise and experience of choice. Nowadays, hundreds of millions of people use the web to compare between goods and services, for example through websites such as Amazon, TripAdvisor, and Yelp. However, to construe such websites simply as neutral tools for enacting 'free choice' fails to recognise how choice is highly 'manufactured, shaped and governed' (Henman, 2007, p.171) in the online world. Drawing on respected scholarship from diverse fields including STS, Foucaultian social theory, social informatics, current and emerging social perspectives of choice, and Internet studies, I have conceptualised this phenomenon as 'Technologies of Choice' (or 'ToC').

This chapter has presented an initial ToC conceptual framework that provides four key 'dimensions' for understanding how choice is constructed and shaped through the architecture and design features of websites. These four dimensions are: (1) Having Choice; (2) Facilitating Choice; (3) Knowledge Production; and (4) Configuring Users. In Chapter Four, the conceptual framework is developed and refined further through an empirical study of 34 websites. Before proceeding further in this analysis, the next chapter details the research design and methods used in this study.

Chapter 3

Methods

The aim of this study is to conceptualise and empirically examine how 'choice' is constructed on the web through the design features and 'architecture' of websites, known as ToC. In order to achieve this over-arching research question (RQ1), a set of methods were devised to address three associated research sub-questions listed below. This chapter details the methods employed to answer these research questions, including the rationale and justification for the methods chosen.

How is 'choice' constructed on the web?

- *(SQ1)* What are the different features of websites that constitute and structure choice?

- *(SQ2)* How widespread are ToC on the web and what are their patterns of distribution?

- *(SQ3)* What different types of ToC are identifiable and to what extent do they shape choice differently?

The study utilised a two-stage 'phased' design (de Vaus, 2001) to answer the research sub-questions, building towards answering the overall research question. Broadly, Phase One involved drawing on and synthesising the literature to develop the four over-arching 'dimensions' of the ToC conceptual framework (see Chapter Two), and subsequently refining and elaborating this framework through the empirical analysis of 34 websites (see Chapter Four). This answered SQ1 by determining the different features of websites that constitute and structure choice, and provided the necessary 'building blocks' to proceed with Phase Two. In the second phase, the ToC conceptual framework was deployed as an

analytical tool to study a sample of 193 ToC websites identified within a sample of 500 top-ranking websites (Chapter Five). Phase Two sought to examine how widespread ToC are on the web and assess their patterns of distribution, as sites and functionalities, providing an answer to SQ2. Further, the second phase of the study aimed to identify different 'types' of ToC (Chapter Five), and discuss the extent to which they shape choice differently (Chapter Six). This provided an answer to SQ3, and contributed to the over-arching question of how choice is constructed on the web.

This chapter is structured into three main sections. In the first section, the methods for Phase One are presented and justified, relating particularly to SQ1. The second section addresses Phase Two and details the methods as they relate to SQ2 and SQ3. The final section of the chapter considers some of the limitations of the methods, discusses the ethical dimensions of the study, and outlines the significance of the methods vis-à-vis their alignment with the over-arching aim of the study.

3.1 Phase One: Elaborating and refining the ToC Conceptual Framework

The purpose of Phase One was to refine and elaborate the conceptual framework presented in Section 2.5 empirically by analysing a large and representative sample of websites that reflect a broad range of ToC. Data were analysed in relation to the four dimensions of the ToC conceptual framework established in Chapter Two, using a modified form of 'webtext analysis' (see Section 3.1.2). This analysis resulted in further refinements to, and elaboration of, the conceptual framework. In doing so, this addressed SQ1, that is, what are the different features of websites that constitute and structure choice?

3.1.1 Sampling and data collection

The unit of analysis in Phase One was websites. For the purposes of this study, 'top-ranking' websites are assessed in terms of popularity, that is, capacity to attract web user traffic. Such websites are more important in empirically understanding how choice is shaped for web users, compared to those sites

that may be differently designed (and hence potentially analytically interesting) but less well used. A purposive sample of 30 top-ranking websites was sampled using the following criteria:

1. Websites where ToC are perceived to be deployed as a primary or significant component;

2. Websites that are widely used (i.e., top-ranking);

3. English-language websites;

4. Websites that are able to be accessed (i.e., not offline or unavailable)[1]; and

5. Websites representing a broad variation of ToC.

The popular 'web rankings' site alexa.com (herein 'Alexa') was used as a 'data frame' to draw a varied sample of ToC from top-ranking websites. The web rankings on Alexa "are based on the traffic data provided by users in Alexa's global data panel over a rolling 3 month period. Traffic Ranks are updated daily. A site's ranking is based on a combined measure of Unique Visitors and Pageviews" (Alexa Internet Inc., 2014). Recent studies indicate that Alexa is a valid and useful data source (Ennew, Lockett, Blackman, & Holland, 2005; Price & Grann, 2012; Reay, Beatty, Dick, & Miller, 2013; Stephen, 2011).

Notwithstanding the documented usefulness of Alexa as a valid data source, several potential issues were identified that related to bias with its 'global' rankings. These issues included; over-representation of particular geographic locations (i.e., the US); over-representation of commercial (com) websites, rather than non-profit organisation websites (org) and government websites (gov); and skew towards particular types of products (e.g., technology). In order to address these issues a level of purposive sampling was used to examine a broader distribution of ToC across the web. This form of data triangulation (Denzin, 1970) involved sampling websites from different website categories as defined on the Alexa website.

As shown in Table 3.1, three categories were selected to examine the deployment of ToC in varied contexts in which 'choice' is exercised, namely commercial or 'shopping' (n=10), consumer information (n=10), and health (n=10). These categories were selected in relation to the literature review in Chapter Two, which described different key social domains in which 'choice' is

[1]There were a small number of websites that were not accessible, for example Netflix.com was not available to be viewed in Australia at the time of data collection, although it would have otherwise been included in the sample.

experienced and enacted. Furthermore, four 'supplementary' websites were included for analysis. Two government websites, namely myschool.edu.au and nhs.uk, were included because they have attracted recent scholarly attention but did not appear in the top-ranking sites sampled in Phase One. Moreover, two commercial sites, namely amazon.com and comparethemarket.com.au, were pre-selected for analysis. Amazon has attracted considerable scholarly attention and is also well known in popular discourse. CompareTheMarket has attracted a lot of media attention and marketing, particularly in Australia and the UK, entering into popular discourse.

Category	**Data 'frame'**	**Sample size**
Commercial	alexa.com/topsites/category/Top/Shopping	N=10
Consumer information	alexa.com/topsites/category/Top /Home/Consumer_Information	N=10
Health	http://alexa.com/topsites/category/Top/Health	N=10

Table 3.1: Sampling frame for Phase One data

Within each category, Alexa provides a list of websites sorted in descending order by their 'global' ranking. A key challenge was ensuring that the 10 selected websites within each category deployed some form of ToC. A heuristic was devised to assist this sampling process. Sites were interpreted as 'ToC websites' if they provide a dominant space in which users compare between and make decisions about options on offer. In other words, if one of the primary aspects of the website is that it provides a space in which 'choice' is enacted and experienced by web users, it was coded as constituting a 'ToC website' (i.e., a website that deploys ToC). The total sample size of N=34 (10 websites in each Alexa category and 4 'supplementary' sites) was perceived as likely to provide data saturation and elicit sufficient empirical data for addressing SQ1. the complete list of 34 sites in the sample for Phase One is available in Appendix A. A further consideration with sample size for Phase One was the length of time involved in analysing the websites using the ToC conceptual framework.

3.1.2 Data analysis

Websites pose a unique challenge for analysis because they comprise a range of media such as text, images, video, audio, dynamically generated content, and interactive systems (Crystal, 2011). As Gravestock highlights, to date there are no uniformly recognised methods for analysing websites (2012). However, an underlying assumption of the research design for this study is that websites can

be thought about and analysed as interactive or dynamic 'texts'. Such an assumption positions websites as "cultural artefact[s] composed or constructed by an individual or group of individuals" (Doloughan, 2011, p. 6), reflecting a constructionist epistemology (Crotty, 1998). However, textual analysis is broad and encompasses a "huge range of methodologies - many of which are mutually contradictory and incompatible" (McKee, 2003, p. 2).

The specific method of analysis chosen for this study is a form of textual analysis adapted from the 'webtext analysis' method posited by Gravestock (2012, p.7) and informed by the four dimensions of the ToC conceptual framework set out in Chapter Two. These four dimensions structured how to interpret the 'textual organisation' (Parker & Burn, 2003, p. 31) of each website under examination. This involved an iterative process whereby data were organised and re-organised into 'themes', or in this case categories, as the analysis took place. As Gravestock describes, the "webtext methodology leads to the organising of data into general categories, with those central to the research question examined in increasingly greater detail" (2012, p. 52).

A key aspect of the analysis was that only the homepage and webpages directly related to comparing between options and experiencing 'choice' were analysed (not every webpage in the entire website). Attention was directed towards webpages that specifically relate to ToC. Hence, the purpose of the textual analysis was not to exhaustively analyse every page and element on each website, but rather to focus on those aspects directly relevant to answering SQ1, that is, the different features of websites that constitute and structure choice.

A spreadsheet was used as a data management tool for this process, with the rows representing the 34 websites and columns recording the emerging 'sub-dimensions' and 'features' of the ToC conceptual framework. In this way, the textual organisation of each website was exhaustively analysed in respect to each of the four dimensions of the ToC framework. New data were used to validate, refine and elaborate the framework, requiring previously analysed websites to be routinely re-evaluated in light of emerging findings. For example, two seemingly distinct ToC features were sometimes combined into a single feature, such that '5 star ratings' and '10 point ratings' were combined into one feature, 'nominal ratings'. Further, individual features were organised into 'sub-dimensions' that grouped particular sets of features into conceptual categories, such as 'scale of choice' and 'characteristics of commensurability'.

This approach to analysis was not straightforward. Indeed, in a study of web-based evaluation schemes, Ziewitz identified that the schemes "stubbornly resisted my attempt to come up with a methodical procedure for classifying and differentiating them" (2012, p. 89). For example, he asks the question: "should singular metrics like Facebook 'likes' count as a 'scheme'?" (2012, p. 89). This reflects the kinds of methodological challenges that I encountered throughout the analysis in Phase One. To address these challenges, the analysis involved constant reference to the literature, strengthening and augmenting the literature that underpinned the original framework (developed in Chapter Two). The analysis also necessitated engaging with literature from a broader range of disciplines, such as information science, in order to understand technical aspects related to particular functionality and features of websites in the study (e.g., the computer science field of recommender systems). The Phase One analysis also involved regular discussions with thesis advisors. Moreover, a range of measures were used to address issues of rigour and trustworthiness (see Section 3.3).

3.2 Phase Two (Content Analysis) – ToC on the Web

The objective of Phase Two was to deploy the detailed conceptual framework arising from Phase One to undertake a large-scale empirical study of ToC on the web, in order to determine how widespread this phenomenon is, including the different patterns and varieties of ToC. To achieve this, Phase Two involved the collection and analysis of data from all 'ToC websites' identified from an overall sample of 500 top-ranking websites. The methods presented in this section are broadly structured into sub-sections. The first sub-section relates primarily to the second research sub-question (SQ2), which asks 'how widespread are ToC on the web and what are their patterns of distribution?'. The second sub-section relates primarily to the third research sub-question (SQ3), namely 'what different types of ToC are identifiable and to what extent do they shape choice differently?'.

3.2.1 Data collection and analysis

The conceptual framework developed and refined in Phase One was used as an analytical tool to perform quantitative content analysis in Phase Two. As McKee argues, quantitative content analysis is a "form of quantitative textual analysis ... [that] breaks down the components of a text into units

that you can then count" (2003, p. 127). The aim of this analysis was to examine the distribution and patterns of ToC for all ToC websites identified within a sample of 500 top-ranking websites. The complete list of the resulting sites in the sample for Phase Two is available in Appendix A.

Similar to Phase One, data collection in Phase Two utilised the Alexa web rankings. As with Phase One, this involved addressing problems relating to bias in the 'overall' category of top-ranked websites. In order to manage this, a level of purposive sampling was used to examine a broader distribution of ToC across the web. This involved sampling websites from different categories on Alexa (Table 3.2).

Category	**Data 'frame'**	**Sample size**
Global	http://alexa.com/topsites	N=100
Recreation	http://alexa.com/topsites/category/Top/Recreation	N=100
Health	http://alexa.com/topsites/category/Top/Health	N=100
Australia	http://alexa.com/topsites/countries/AU	N=100
United Kingdom	http://alexa.com/topsites/countries/GB	N=100

Table 3.2: Sampling frame for Phase Two data

The rationale for selecting these categories was derived from Phase One and the literature review. The 4th (Australia) and 5th (UK) categories were selected to enable cross-country comparisons in the way choice is shaped on the web through ToC. In order to analyse and categorise websites by market sector, this study drew upon the standardised Industry Classification Benchmark (ICB). The aim of this analysis was to provide greater insight into the characteristics of ToC websites in the Phase Two sample, in addition to the 'basic' characteristics of generic top-level domain (gTLD) and the five Alexa categories the sites were sampled from.

The ICB was developed by Dow Jones & Company and FTSE Group, and has become a globally accepted standard since it provides a framework to categorise companies according to market sector. The 'supersector' component of the ICB was adapted in this study, providing the ability to classify websites into 18 discrete categories according to their market orientation. There were no existing data available to draw on, so the 'supersector' data had to be collected by the author. This was achieved by manually coding each of the 500 sites in the study sample using a qualitative coding approach. For example, booking.com was classified into the 'Travel and Leisure' (TL) supersector, and bankofamerica.com into 'Banking' (BA). Notably, four extra categories (namely: 'Government', 'Social Care', 'Education', and 'Employment') were added to the 18 existing 'supersector' categories of the ICB, providing 22 categories in total. These categories were added in order to better

differentiate government ToC websites that relate to various public policy settings, particularly given that ToC appear to be increasingly deployed by the state (discussed in Chapter Two). The complete list of supersectors are provided in Appendix A. The 'government' supersector is used for government websites that are not clearly related to any particular sector. For example, the UK government web portal gov.uk is assigned to the Government sector, whereas the UK government NHS website nhs.uk is assigned to the Health sector.

The first step for data collection involved determining which sites out of the 500 are sites containing a ToC. The same rationale used in Phase One for identifying 'ToC websites' used in Phase One was adopted again in Phase Two. In this way, if one of the primary features of the website is that it provides a space in which 'choice' is available and and enacted by web users, then this site was coded as a 'ToC website' for further analysis.

The second step involved analysing the resulting 193 'ToC websites' within the overall sample of 500 top-ranking sites, using the conceptual framework as a tool to examine each site and determine which ToC features it deployed. For example, if a site deployed 'unary ratings' then the corresponding dichotomous variable was marked with a "+", or otherwise if unary ratings were not deployed then a "-" was supplied.

Descriptive statistics was used to describe the most important features of the data resulting from the 193 sites examined, in this case the distribution of ToC features in the data sample (Larson & Farber, 2005). In order to examine whether particular ToC features tended to be associated with particular types and categories of websites, Fisher's Exact Test was used to examine dependent relationships between these variables (Sprent, 2011, pp. 524-525). This provided a technique to uncover relationships of interest in the data, providing a basis for further examination using multiple correspondence analysis and hierarchical clustering, as discussed in the next section. Fisher's Exact Test was used instead of the chi-square test because it is better suited to data with a small sample size (McDonald, 2014, pp. 86-89), which applied to the sample size in this study.

3.2.2 Multiple correspondence analysis and hierarchical clustering

The methods outlined in the previous section were primarily linked to answering SQ2, that is, how widespread are ToC on the web and what are their patterns of distribution? However, different methods were required to answer SQ3, which asks: what different types of ToC are identifiable and to what extent do they shape choice differently? To answer this, an Exploratory Data Analysis (EDA) approach was used. As described in the literature, EDA was developed as a statistical approach to summarising, describing, and visualising data sets (Tukey, 1977; Hartwig & Dearing, 1979). As Morgenthaler suggests, "exploratory analysis looks at the data from as many angles as possible, always on the lookout for some interesting feature. The data analyst is interested in uncovering facts about the data" (2009, p. 33).

Nowadays, increased computational sophistication enables researchers to conduct a wide range of EDA techniques and scale up their data sets in ways previously not possible (Martinez & Martinez, 2005). Indeed, the field of 'data mining' has developed to expand the scope and sophistication of EDA as a computational approach to extracting insights from digital data (Myatt & Johnson, 2014). In this study I adopted a 'data mining' approach to answering the associated research sub-question (SQ3). Specifically, a 'two step' analytical approach was used that involved a combination of Multiple Correspondence Analysis (MCA) and Hierarchical Clustering (HC). Firstly, I will provide details of MCA and HC, before describing how these methods were used. It is noted that the R statistical programming language was used to perform analysis, using the *FactomineR* package (Husson, Josse, Le & Mazet, 2015). R is an open-source programming language and environment for statistical computing and graphics[2].

Multiple Correspondence Analysis (MCA)

Broadly, MCA is a paradigm of geometric data analysis (Le Roux & Rouanet, 2010, pp. 1-4) that enables researchers to "analyze the pattern of relationships of several categorical dependent variables" (Abdi and Valentin, 2007, p. 1). Similar to Principal Component Analysis (PCA), MCA represents the data as points in Euclidean space and assesses their proximities in a low-dimensional map (Abdi & Valentin, 2007). Like PCA, this exposes patterns in and summarises the data by reducing its dimensionality whilst retaining a maximum amount of variance, that is, preserving

[2]For further details see https://www.r-project.org/about.html

maximal distance between individuals (Husson, Josse & Pages, 2010, p. 2). MCA was selected as a method in this study because the categorical data expressed through the ToC conceptual framework were not well suited to PCA. In social science research, MCA is often associated with the sociological work of Bourdieu (1979; 1988; see also Bourdieu & Clough, 1996). Indeed, Bourdieu used the geometric data analysis approach to quantifiy and formalise his own theories, particularly that of 'field', in a manner that attended to the multidimensional, relational nature of social reality (Lebaron, 2009). Lebaron argues that Bourdieu's use of geometric modelling to quantify social space and explore sociological problems has inspired a range of recent studies (2009, p. 13).

For MCA, the 'principal axes'[3] that emerge from the analysis provide compressed representations of the data in decreasing order of importance, that is, amount of variance explained. In this way, the first principal axis is the most important[4], followed by the second principal axis as the second most important, and so on. After conducting MCA, a key question is how many principle axes to retain for further analysis. It is common for only the first two or three axes be retained, although this differs according the research context (Abdi & Valentin, 2007).

Cangelosi and Goriely (2007) compare different approaches to choosing the number of principle axes, which they describe as the problem of component retention. They conclude that there is no single resolution to the problem of component retention. However, one of the approaches that they regard as suitable is Cattell's scree test, which is the approach I adopted in this study. Cangelosi and Goriely argue that "Cattell's scree test looks for an inflection point in the graph of the eigenvalues, which are plotted in descending order" (2007, p. 10). In this way, we find the 'elbow' of the graph, then retain all the components that are above the elbow. To illustrate this, Figure B.1 (Appendix B) shows the results of MCA performed on variables within the 'Facilitating Choice' dimension of the ToC conceptual framework. In Figure B.1, the y-axis represents the eigenvalues and the x-axis represents each principal axis that resulted from MCA. Figure B.1 shows that the 'inflection point' occurs at Axis 5, so on the basis of Cattell's scree test it is argued that the first four axes are retained. In other words, in this example the first four principal axes are considered for further analysis because they embody the most important aspects of the data under examination. Where necessary, a 'ventilation' level of

[3]The term 'principal component' is also used somewhat interchangeably with 'principal axis', although the former is more often associated with Principal Component Analysis (see Cangelosi and Goriely, 2007).

[4]Representing the eigenvector with the highest eigenvalue (i.e., the most amount of variation in one direction)

0.05 was used in order to exclude categories that occur in less than 5% of active variables, preserving the constitutive properties of MCA (Le Roux & Rouanet, 2010, p. 204).

As a result of this analysis, I was able to identify which variables (i.e., ToC 'features' in the data set) were the most 'important' within each of the four dimensions in the ToC conceptual framework. More specifically, this analysis identified the variables that exhibited the highest correlation coefficient [5] on the principle axes that were retained as a result of MCA (see Appendix B). These variables were then characterised as 'emblematic' in describing each axis that was retained from performing MCA, providing the strongest insights. Moreover, taken together this subset of variables provided an 'emblematic data set' that contained the most important variables across all four dimensions of the conceptual framework. As described later in this section, MCA was performed on the 'emblematic data set' in order to identify a final set of principal axes for further interpretation and analysis.

Hierarchical Clustering (HC)

Having derived the 'emblematic data set' from the MCA, hierarchical clustering (HC) was then used to find natural groupings or 'clusters' of ToC websites. The aim was to identify clusters of ToC websites that tend to deploy the same sets of ToC features more often in comparison to other clusters of websites. In other words, the clustering approach sought to minimise the within-group variation whilst also maximising the between-group variation. In this analysis, I directed attention from the variables (i.e. ToC features) towards the websites themselves, or more specifically the clusters that the ToC websites were classified into as a result of HC.

Husson et al. (2010) argue that to better highlight and describe the relationships and resemblances between individuals in a data set, a combination of MCA and clustering methods can be used. In this way, clustering techniques complement MCA, whereby a clustering technique such as HC is performed on the principal axes retained from MCA. This achieves at least two outcomes. First, using MCA as a 'preprocessing step' for HC "can be viewed as a de-noising method which separates signal and noise: the first dimensions extract the essential of the information while the last ones are restricted to noise" (2010, p. 2). Second, it provides both a continuous view of the data (i.e., the trend identified by the principal axes), as well as a discontinuous view (i.e., the clusters) (2010, p. 5). In this way, before performing MCA the variables are categorical, but after performing MCA we are able to assess the

[5] Only statistically significant results were considered, i.e., having a P-value less than 0.05.

trends of how each variable relates to each principal axis by examining the correlation coefficient estimates (see, for example, Table B.1 in Appendix B). Moreover, the clusters that emerge from the data therefore represent deep or 'high level' patterns within the data, whereby the most important or 'emblematic' *features* of ToC websites (i.e., data columns) have been summarised (using MCA), and the individual *websites* (data rows) have been characterised (using HC). Indeed, recent studies suggest that this two-step combination of MCA and clustering works effectively in a social science context (Paris & Teye, 2011; Wen & Chen, 2011; Guinot et al., 2001).

HC is a technique that enables the individuals in a data set to be organised into an indexed hierarchical tree, known as a dendrogram (Husson et al., 2010, p. 2). As Jain et al. describe, "a hierarchical algorithm yields a dendrogram representing the nested grouping of patterns and similarity levels at which groupings change" (Jain, Murty, & Flynn, 1999, p. 275). The dendrogram is then 'cut' in order to derive an optimal partition or 'clustering' of individuals. The 193 websites in Phase Two of this study are the 'individuals'. To undertake HC, the software used in this study utilises Ward's method, which is a 'bottom up' or agglomerative approach (Husson et al., 2010, p. 171). Essentially, Ward's method poses the problem of clustering as an analysis of variance problem (Everitt, Landau, Leese, & Stahl, 2010, pp. 71-110). As Husson et al. write, this process broadly involves firstly building the hierarchical tree or dendrogram, calculating the *sum of within-cluster inertia* (i.e., multidimensional variance) for each partition, and finally determining an 'optimal' partition (2015, p. 28), discussed further below. The agglomerative method of hierarchical clustering means that each of the 193 websites in the Phase Two sample starts as its own cluster or 'leaf' of the tree. At each step of the algorithm, pairs of clusters are merged together (i.e., agglomerated) into 'branches' higher up the tree if they satisfy a similarity criterion, in this case Ward's minimum variance criterion[6]. For this study, variance relates to which ToC features (i.e, variables) are deployed by individual websites. Hence, at each step, clusters (containing individual websites) are merged such that the increase of within-cluster inertia is minimum. This results in a set of different partitions of the data that reflect different numbers of clusters.

A crucial consideration of the analysis is how many clusters to retain, or as Everitt et al. describe, the "choice of partition" (2010, pp. 95-96). In other words, in Phase Two of this study we ask the question: which particular partition or 'clustering' of the data best represents the natural groupings of the 193

[6]That is, leading to a minimal increase of total within-cluster variance after merging.

ToC websites, in terms of which ToC features are deployed (and not deployed)? The approach I adopt in this study utilises a well-established criterion based on the growth of inertia (Husson et al., 2010, p. 4). To determine the 'optimal' number of clusters (i.e., where to 'cut' or partition the tree), firstly the sum of within-cluster inertia for each partition is calculated. The 'optimal' or suggested partition is the one that has the higher relative loss of inertia (Husson et al., 2015, p. 28). In this way, a partition into Q clusters is suggested when the increase of between-inertia between Q - 1 and Q clusters is much greater than the one between Q and Q + 1 clusters (Husson et al., 2010, p. 4). More formally, let Δ(Q) be the between-inertia increase when moving from Q - 1 to Q clusters. The criterion proposed is:

$$\frac{\Delta(Q)}{\Delta(Q+1)} \tag{3.1}$$

The number of clusters Q that minimises this criterion is kept[7]. In other words, the results of this equation provide the optimal number of clusters of ToC websites, which are found at a particular partition of the dendrogram (the 'optimal' cut of the tree). Proceeding from this, the resulting clusters can then be analysed to understand their composition (i.e., what kinds of ToC websites are observed in each cluster). The results of this analysis provide the ability to reason about, and answer, the third research sub-question of the study (SQ3), namely: what different types of ToC are identifiable and to what extent do they shape choice differently?

Process of analysis using MCA and HC

As discussed previously, a two-step process was used combining MCA and HC. Firstly, data analysis was 'scaffolded' by performing MCA *individually* on each of the dimensions 2, 3, and 4 of the conceptual framework. Data from the first dimension of the conceptual framework (i.e., 'Having Choice') was excluded from the MCA calculation, but included as 'supplementary variables' in the MCA[8]. The reason for excluding variables within the 'Having Choice' dimension was that these data did not constitute a focus of inquiry in Chapter Six (which is concerned with the functionality and design characteristics of ToC, rather than the types or scale of options that are on offer through the websites). This 'scaffolding' approach to MCA identified the most important or 'least noisy' data for

[7] This formalisation draws directly from Husson et al. (2010, p. 4).

[8] As a result, whilst variables in the 'Having Choice' dimension did not influence the calculation of eigenvalues, these data still provided useful supplementary insights for answering the third research sub-question (SQ3). Further, this methodological decision resulted from numerous discussions with thesis advisors.

further analysis (Husson et al., 2010, p. 2). More specifically, this provided a subset of 18 'emblematic' variables, representing the 'most important' features within the conceptual framework. This smaller set of 18 variables assisted interpretation of the findings by reducing its complexity whilst still explaining most of the variance in the data. Having derived the 'emblematic dataset', MCA was performed on these 18 variables. This provided more succinct interpretations of how ToC features (i.e., variables) are deployed or not deployed by websites (that is, by reducing the dimensionality of the data). Secondly, HC was performed on the 4 principal axes retained from the previous step, that is, from performing MCA on the 'emblematic' dataset. This identified whether, and how, there are 'clusters' of websites in the data that tend to deploy particular sets of ToC features. The resulting clusters provided key findings for further interpretation and discussion in Chapter Six.

3.3 Trustworthiness and rigour

In order to maintain a high degree of quality and trustworthiness in research, measures must be taken to address issues relating to bias and rigour (Huberman & Miles, 2002; Willis, 2007). Whilst issues relating to bias are addressed in the next section, several measures were undertaken to ensure trustworthiness. Firstly, regular meetings with supervisors were used to 'peer examine' and audit the data collection and analysis, as well as discuss issues relating to conformability and credibility of the research (Bryman & Burgess, 1999). This helped to provide and maintain rigour and consistency, particularly in refining and applying the conceptual framework. Peer examination also occurred at three 'Work in Progress' thesis seminars that took place at the University of Queensland (as part of the Research Higher Degree requirements). A peer-reviewed conference paper was also presented at The Australian Sociological Association (TASA) Annual Conference in 2014 (Graham, 2014). This paper exposed the project and its methodology to the scrutiny of peer reviewers and public questioning from established academics. This provided helpful and critical feedback about the research design, particularly sampling issues and analytical methods, as well as the literature and theories underpinning the study.

In Phase Two of the study, analysing 193 websites was an ambitious undertaking. McMillan argues that most website content analyses are conducted within 4 to 8 weeks, ensuring that the content of

such websites is not changing and thus causing problems for validity (McMillan, 2000, as cited in Kim and Kuljis, 2010). Although effort was made to collect data within a period of two months, the final time taken was approximately three months, as the process of data collection was considerably more involved than anticipated. This posed a methodological challenge for Phase Two of the study.

Another aspect of trustworthiness relates to the reproducibility of the research. By clearly articulating the methods and steps taken to collect and analyse data, the study maximised the potential to replicate the study and undertake similar kinds of studies. Further, the majority of the analysis was undertaken using the R programming language, which enabled the author to 'codify' the steps of the analysis into R scripts. This means that future researchers can run the analyses on the study data or their own data[9].

Reflexivity is important in recognising the influence of the research on the processes and outcomes of the study (May and Perry, 2011) and the knowledge produced from it, known as epistemological reflexivity (Anderson, 2008). To the extent applicable in this thesis, reflexivity was maintained through the use of analytical memos (Snyder, 2012) and 'comments' in the spreadsheets and text, which were regularly discussed with, and audited by, thesis supervisors.

3.4 Strengths and limitations

There are multiple approaches that a researcher might take in conducting social science research, each with their own strengths and weaknesses.

In considering the limitations of the research project, there is an absence of human participants in the study. Including human participants would have enabled an analysis of *how* individuals use and interpret ToC, *why* individuals use ToC, or in what ways particular types or features of ToC influence or 'nudge' users towards making particular choices (Thaler & Sunstein, 2009). The decision of whether or not to include human participants in the study was a key consideration during development of the research design. However, because ToC have only recently emerged (and are so poorly understood), it was decided that the study needed to focus on firstly conceptualising and empirically analysing ToC, that is, the technologies themselves. Indeed, there was an extensive amount of work required to even begin answering the most elementary questions about ToC and their role in constructing choice on

[9] The data and R code will be made available in the near future through the UQ eSpace: http://espace.library.uq.edu.au/.

the web. This was a key driver for the research design and associated research questions. At the same time, as discussed in Chapter Seven, this study opens up key areas for future research into how people use and interpret ToC (see Section 7.5.1).

Following the previous point, a strength of the study lies in the approach to data sampling, that is, the selection of websites for analysis. In this way, the question as to *whether* people use ToC is implicitly answered via the research design: only top-ranking sites are examined, meaning that millions of people use ToC. This adds value to the findings of the study and its contribution to knowledge (see discussion in Section 7.3).

Data collection was limited in several ways. First, although Alexa is recognised in the literature as a viable data source, the Traffic Rankings data it collects and publishes does have some degree of bias and skew, as described earlier. This impacts the generalisability and validity of the findings, although several measures taken in this study to mitigate these shortcomings (see previous discussion in this chapter). Second, the sample size for Phase One (N=34 websites) and Phase Two (N=500 websites) were influenced by factors relating to time, scope and feasibility. Although a strength of the study is that a satisfactory level of data saturation was obtained in Phase One (to answer SQ1), and a sufficiently large sample of websites was analysed in Phase Two (to answer SQ2 and SQ3), it is acknowledged that a larger sample size in both phases would have enhanced the validity and generalisability of the findings.

Furthermore, there is bias in the 'top 100' sites within each of the five categories sampled from Alexa (see Section 3.2.1; see also Table 3.2). For example, with a few rare exceptions these categories did not contain government websites. There also appeared to be a bias towards US websites, rather than websites with an international flavour, despite measures taken to sample from other countries (i.e., Australia and the UK). Again, a larger sample size and a broader range of sampling categories may have strengthened the research project by mitigating some of these biases.

3.5 Ethical considerations

It is not envisaged that there would be any major ethical considerations in this study. There were no human subjects involved in the study and all of the data were publicly available. Furthermore, peer

review of the proposed study as part of the requirements of The University of Queensland did not specify that ethical clearance was required for the study. However, there is now a well-established literature highlighting serious ethical and privacy issues for publicly shared digital data (Andrejevic, 2007; Moreno et al., 2013; Zwitter, 2014). With this in mind, although the particular type of data in this study did not raise serious ethical and/or privacy issues[10], steps were taken to ensure the privacy of individuals who might be identified through the study. Screen captures of websites that included user profiles or details were de-identified by blurring out the photos, names, and individualising profile characteristics of users. In cases where users appeared to have used their real names, these were de-identified through the use of pseudonyms. Furthermore, in considering the ethical dimensions of the study, I adopted the stance of the "positioned researcher" who is both reflective and reflexive (Jones and D'Cruz, 2004, p. 32), in order to increase my awareness of the ethical and political context of the research.

3.6 Conclusion

This chapter has outlined the research design and methods used in this study. It has delineated how data were collected and analysed with respect to each of the two 'phases' of the research project. Moreover, this chapter has described how the research design and methods link up to, and address, the over-arching question of the study: how is 'choice' constructed on the web? In addition, it has explained and justified the methods used to address three research sub-questions that contribute to answering this over-arching question. The strengths and limitations of the methodology have been outlined. Challenges and issues relating to trustworthiness and rigour have been discussed, and a consideration of ethics was undertaken. The next chapter presents the revised ToC conceptual framework that results from the empirical analysis of websites. In doing so, it marks the end of Phase One and provides an answer to the first research sub-question (SQ1), namely 'what are the different features of websites that constitute and structure choice?'.

[10] Given that the focus is not on users but design features and characteristics of websites.

Chapter 4

The revised ToC conceptual framework

4.1 Introduction

The purpose of Phase One in this research study is to elaborate and refine the ToC conceptual framework through the empirical analysis of websites identified as ToC. As discussed in Chapter Three, 30 top-ranking websites were sampled across three categories: Consumer Information (10); Commercial (10); and Health (10). Furthermore, four supplementary 'exemplar' websites were also included in the analysis because of their importance in the literature and popular discourse. This provided a sample of 34 websites for further analysis[1]. Throughout this chapter the findings from the website analysis will be reported, including how these findings were used to elaborate and further develop the four dimensions of the ToC conceptual framework.

The revised conceptual framework is illustrated in Figure 4.1. Figure 4.1 reproduces Figure 2.1 from Chapter Two, but adds 12 new *sub-dimensions* that further categorise how 'choice' is shaped on the web. In addition, there are 56 *features* identified and classified across the 12 sub-dimensions. These constitute a 'taxonomy' of the different website features that can be deployed (or not deployed) to construct a space of choice within a given website. Moreover, this provides an answer to the first research sub-question (SQ1), namely: what are the different features of websites that constitute and structure choice?

[1] The complete list of 34 sites in the sample for Phase One is available in Appendix A

The remainder of this chapter is structured into four main sections that address each of the four major 'dimensions' of the conceptual framework in turn, including the 'sub-dimensions' and 'features' for each sub-dimension. By the conclusion of this chapter a central aim will have been achieved: to present a revised conceptual framework that can be used as a conceptual and theoretical tool to empirically examine and analyse ToC websites.

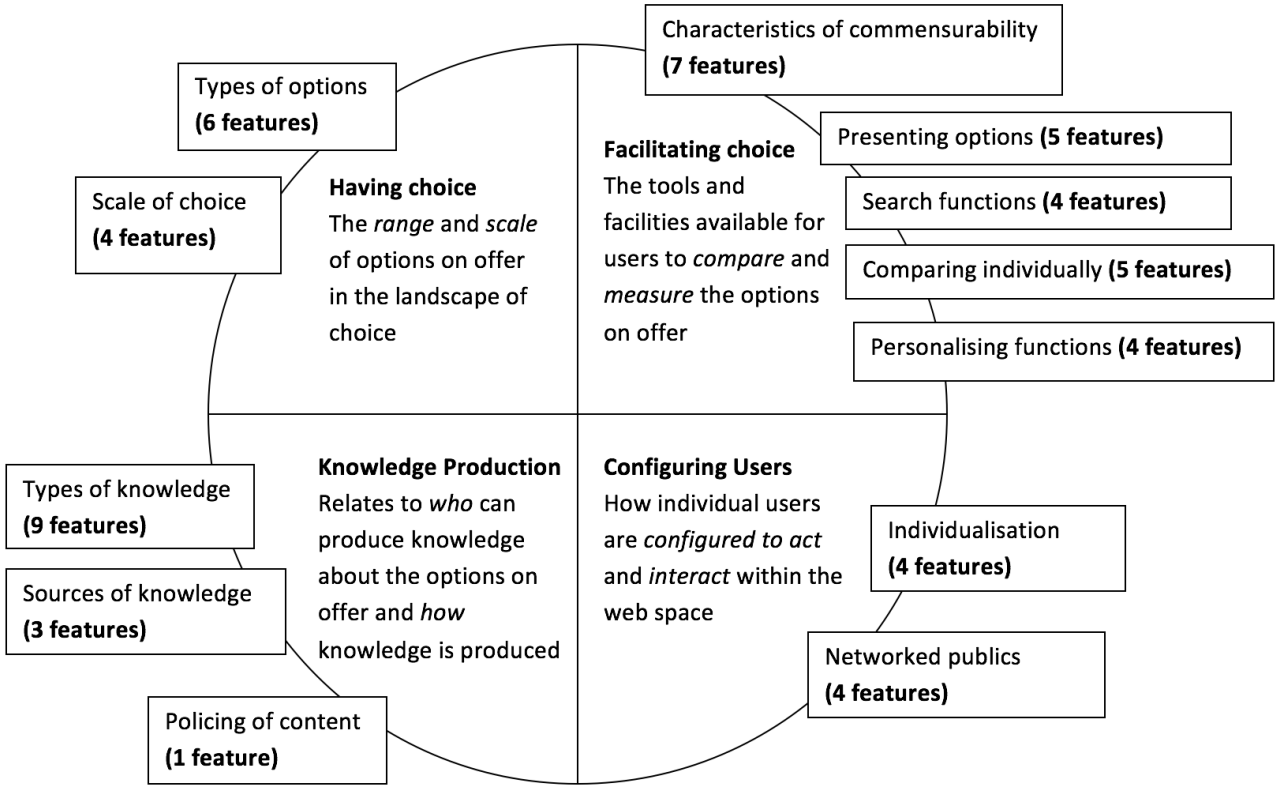


Figure 4.1: The revised and elaborated ToC conceptual framework

4.2 Having Choice

As discussed in Chapter Two, when confronted with choice, the first question to consider is: what are the options? People are accustomed to understanding how different spaces and situations provide different types and ranges of choice. For example, shopping at a luxury car dealer will provide an expensive range of options for cars such as BMW, Lexus, and Porsche, rather than affordable cars such as Toyota, Mazda or Nissan. Similarly, one might shop at a multinational supermarket for general groceries, but visit a local seafood market for better range of choice in fresh fish. Taken more broadly, a

job-seeker living in the country might move to a major city under the assumption that there will be more choice in job options. Implicit in these examples is the notion that different spaces provide different kinds of choice in different ways. To a certain extent this is a self-evident observation. However, the way in which online spaces (websites in this study) provide different types and scales of choice is not always clear or straightforward.

This problem constitutes the focus of the first dimension of the ToC conceptual framework — 'Having Choice' — which provides the ability to capture and categorise what kinds of options people 'have' in a given ToC website. If one considers the 'universe of choice' to represent all the options in the world that a person can possibly choose from, the Having Choice dimension examines how this 'universe' of choice is delimited into a particular subset, or 'landscape' of choice within each website. The analysis conducted and reported on in this section shows that the choice that users 'have' is shaped in two broad ways, namely, the 'types of options' on offer (sub-dimension 1) and 'scale of choice' provided (sub-dimension 2).

4.2.1 Sub-Dimension 1: 'Types of options'

'Choice' involves comparing between options and making a decision. Yet not all options are alike. There are clearly different classes or types of options, which could be distinguished using a variety of classificatory frameworks. This study employs an economic distinction that categorises types of options broadly within the remit of economic theory. This method of classification is a new refinement to the conceptual framework that results from the observation that ToC websites do not only provide comparisons between 'products', but also a range of other types of options. In this study, six types of options were identified that fall within the broad categories of goods versus services. Each type of option may, or may not, feature within a given ToC website. For example, a website may provide comparisons between private services (such as dentists), but not private goods (such as dental products).

Goods (e.g., books, cars, downloadable music, cinema)

1) Private goods

2) Club goods

3) Common goods

4) Public goods

Services (e.g., technical support, education, plumbing, dentistry);

5) (Private) services

6) Public services

This section examines the definitions and boundaries of these six types of options by drawing upon examples drawn from the empirical analysis of websites. As will be shown, the features used to categorise types of options are not always mutually exclusive (i.e., a type of option can fall within multiple features). Similarly, there are instances where types of options do not have a 'clear cut' definition or the category is contested (e.g., digital music streaming, e-books). Despite this it is argued that economic theory provides a fruitful—if not perfect—approach to distinguishing between different types of options that make up the ability to 'have choice' in a given website. The aim in this section is to elucidate this claim and provide empirical examples to both problematise and support it.

Goods

The Oxford Dictionary of Economics defines good(s) in two ways: (1) "things people prefer to consume more of rather than less"; and (2) "economic assets taking a tangible physical form, such as house or clothes" (Black, Hashimzade, & Myles, 2013). However, by itself the concept of goods is too abstract because clearly there are different types of goods that can be distinguished between. For example, a portable DVD player is different to cable television (i.e., satellite or pay TV) because the former is a 'private good' (i.e., one person's use of it excludes others and that person is entitled to exclude others) whilst the latter is a 'club good' and is accessible for paying customers (i.e., one person's use of it doesn't exclude others and no person has the ability or right to prevent other people from using it). The broad concept of a 'good' does not fully capture the heterogeneity of options on offer through ToC websites. As a result, it is operationalised into four features examined in this section.

Private goods

The Oxford Dictionary of Economics defines a private good as "any good or service which is rivalrous (if used by one individual or firm it is not available to others) and excludable (the owner can costlessly prevent other individuals or firms from consuming it)" (Black et al, 2013). Using examples from the websites analysed in this study, this provides a useful feature to categorise, for example: cars (kbb.com, edmunds.com); bodybuilding supplements (bodybuilding.com); furniture (ikea.com); makeup products (totalbeauty.com, makeupalley.com); and mobile phones (gsmarena.com). These are all tangible private goods that take a physical form. Nevertheless, the boundaries of 'private goods' become contested when one encounters non-physical digital products such as movie downloads, streaming music, and e-books. Whilst there are multiple contested interpretations and categorisations of digital products (e.g., different legal statuses, varied terminology, different types of digital media and different platforms for 'consuming' these media), in respect to ToC these are categorised as private goods that have the additional properties of being intangible and information goods (Shapiro & Varian, 1999). That is, the customer is purchasing the right to access or store these intangible (i.e., non-physical or informational) goods for personal consumption of the information they contain. To illustrate this using an example, if a person compares between digital music albums on amazon.com, ultimately the product that they purchase (i.e., download) is for their personal use only (i.e., it is a rivalrous good) and if somebody else wants to listen to it (e.g., on the owner's computer or iPod), the owner can (theoretically) exclude them from doing so. Classifying intangible digital products as private goods is an expedient way to organise them using the conceptual framework. However, it is acknowledged that the definition and interpretation of 'private goods' set forth here can be problematised on a number of grounds (e.g., legal, ontological, epistemological), which will not be considered further here.

Club goods

This feature is positioned in the well-established field of club theory within economics (Glazer, 1997), which offers an entire literature on the notion of a 'club good'. Here a club good can be simply defined as "an excludable but non-rivalrous public good for the club members" (Cassone and Ramello, 2012, p. 100). Thus, the non-rivalrous nature of club goods differentiates them from private goods. For example, cable or 'pay-to-view' television is a club good because it requires a subscription fee to 'join the club' (it is excludable), and one person's usage does not exclude anybody else from using it (it is non-rivalrous). On the other hand, 'free-to-air' television is a *public good* because anybody with a

TV and a receiver can access it (it is non-rivalrous and non-excludable). This can be contrasted with a physical DVD, which is a private good (being both rivalrous and excludable). As was discovered during the website analysis, websites such as yelp.com enable users to compare between club goods, for example, cinemas, gyms, and sporting clubs. These types of options are different from private goods because, although they are exclusive goods (e.g., requiring a membership or fee payment), they are also non-rivalrous in the sense that one person's consumption does not deny others the same benefit. Notwithstanding, club goods are a distinct type of option that people can compare between using ToC.

Common goods

Although 'common goods' is a term that is often used in economic theory, it is often conflated or confused with the notion of 'public goods' even though there are valid—and analytically useful—ontological and epistemological distinctions to be made (Quilligan, 2012). These distinctions are outlined in this section and discussed vis-à-vis ToC. In respect to ToC, common goods can be defined as "the shared resources which people manage by negotiating their own rules through social or customary traditions, norms and practices (Quilligan, 2012, p. 3). Such a definition is consonant with the term 'common access resource', which the Oxford Dictionary of Economics defines as "a resource, or good, whose characteristics make it costly to exclude potential consumers from its usage, and which is vulnerable to congestion and overuse". This does not mean that common goods are not also co-governed by the state. On the contrary there are multiple and often complex laws and regulations governing the use of common goods and resources, including authorities and agencies that police and oversee them.

Nonetheless, it is argued that common goods differ from public goods for at least two reasons: (1) common goods are not delivered or necessarily featured by government; and (2) common goods tend to be rivalrous whereas public goods do not. For example, wild fish in a lake are a common good because a person cannot exclude others from catching fish from the lake (unless they have a legal right to), but once a person catches a fish it cannot be caught by anyone else (and if the lake is over-fished it can become depleted). This is distinguishable from public goods such as highways, which are non-rivalrous. Similarly, common goods can also include natural resources such as lakes, national parks and forests, and arguably even holiday destinations (e.g., tripadvisor.com). To the extent that people can compare between such options in order to make a decision indicates that common goods fall within the remit of ToC.

Public goods

The Oxford Dictionary of Economics defines a public good as "a good that no consumer can be excluded from using if it is supplied, and for which consumption by one consumer does not reduce the quantity available for consumption by any other" (Black et al, 2012). In other words, a public good is both non-excludable and non-rivalrous. In practice there are very few 'pure' public goods because most public goods do not perfectly satisfy these two conditions (Black et al., 2012). For example, public roads can become congested when too many people try to use them simultaneously. As a result, public goods also include 'impure' public goods, for example sewer systems and public parks. These are impure because they are excludable (but only at a high cost), and in certain conditions are rivalrous if too many people try to consume them simultaneously. Public goods can be defined as: (1) a physical or tangible economic good; and (2) a good delivered or featured by government. This makes a distinction between public goods and 'public services', which are considered intangible economic goods (discussed in the next section). For example, yelp.com provides the ability to compare between public parks (Figure 4.2).

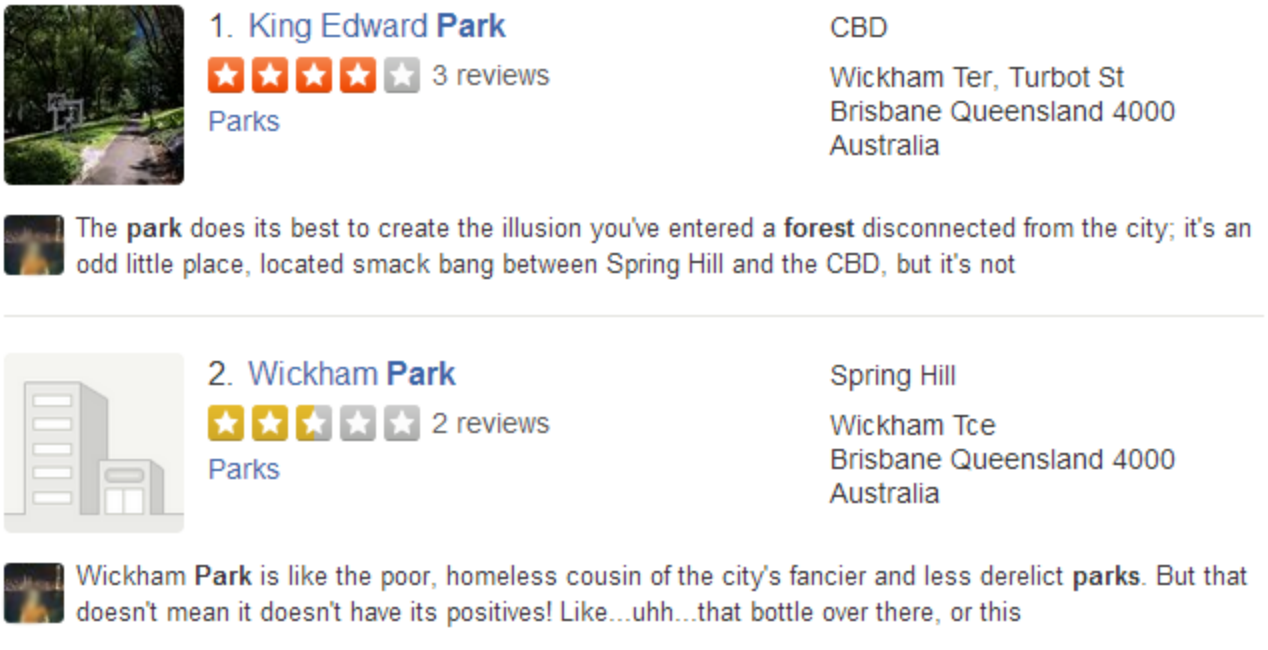


Figure 4.2: An example of public goods as a type of option in ToC (yelp.com)

Services

The Oxford Dictionary of Economics defines services as "economic goods which do not take a tangible and storable form. In some cases these require the physical presence of the customer, as for example with hairdressing, medical treatment, or live entertainment. In other cases services can be performed at a distance: for example, legal representation or insurance" (Black et al, 2013). A service can be understood as "a product which is not embodied in a physical good and that typically effects some change in another product, person or institution" (Brian, 2009, p. 159). Thus, examples of services drawn from the website analysis in this study include: private health insurance (comparethemarket.com.au); doctor services (vitals.com); private health care providers (kaiserpermanente.com, sutterhealth.com, clevelandclinic.org); technology support and repair services (bestbuy.com); drug providers (drugs.com, http://reference.medscape.com); and types of medical services for particular health concerns (webmd.com).

In the case of insurance one is confronted with a dilemma regarding whether to classify it as a good or a service. This is an ontological dilemma that arises when attempting to classify options on offer that skirt definitional boundaries, as discussed in Section 4.2.1.1 in relation to digital media. Although there is no universally applicable solution to this problem, for the purposes of ToC definitional boundaries can be specified by applying the definition of services set out at the beginning of this section. In this way interpret insurance can be interpreted as services rather than goods because nothing is actively produced and no tangible items are exchanged. Again, one might argue that such a definition also applies to digital media products such as digital music downloads (which are classified as private goods in ToC). However, a digital song differs from insurance because it is readily converted from—and to—tangible assets (e.g., a CD or vinyl record). Similarly, as noted previously, digital media are information goods because their value is encoded as information and consumed as a product (Shapiro & Varian, 1999). Notwithstanding, it is difficult to precisely define and classify particular options on offer, particularly when the commercial transaction is mediated electronically (i.e., through a website). This section provides one interpretation and method to resolve such issues, which have been illustrated using examples drawn from empirical analysis of websites.

Public services

Public services are a subset of services. This feature describes services that are provided through government provision to citizens within the government jurisdiction. There is a degree of crossover between the public and private sector because, for example, some public services are financed by the government or commercial sector but delivered through private organisations. For example, a range of social services in Australia are delivered by private organisations but funded by government or private philanthropic grants. In this respect, public services are specifically defined here as publicly funded services that are provided either free or very low-cost to citizens. Examples of public services include the National Health Service in the UK (as they are health and social services that are free at the point of use for residents in the UK), and the public education system in Australia (which is free to attend for Australian citizens and permanent residents).

One website sampled from alexa.com provides choice in public services. This website was vitals.com, which enables users to rate and compare health services in the USA (both private and publicly funded health services). The two government ToC websites that were included as supplementary 'exemplar' websites in the analysis (i.e., nhs.uk/service-search and myschool.edu.au) provided choice in public services, however, as discussed in Chapter Three, these websites were purposively sampled (i.e., not sampled from alexa.com).

4.2.2 Sub-Dimension 2: 'Scale of choice'

Choice involves comparing between options and making a decision. For example, when visiting the fish shop should one purchase imported or domestic, farm-fed or ocean-sourced, locally sourced or brand name? One way to understand how choice is shaped is by examining the scale at which choice is provided. Hence, 'scale of choice' is a new addition to the conceptual framework that examines how options on offer can be further categorised in terms of the scale at which choice operates and is provided. Four scales of choice emerged from the analyses: (1) global; (2) brand; (3) geography / jurisdiction; and (4) contractual. However, it is also noted that scales of choice are not mutually exclusive, that is, options on offer can be provided at more than one scale.

The **global** scale of choice refers to ToC websites where the scale of options on offer is not limited in any particular way. For example, yelp.com enables users to compare (and rate and review) local businesses based anywhere in the world. Similarly, newegg.com allows users to compare, rate, and

review and purchase almost every type of computer software and hardware on the planet. If the options on offer are limited to particular companies or brands, then the scale of choice is **brand**. For example, several 'health' websites analysed in this study enabled users to compare and select between doctors and health services in the US, but only those services belonging within the conglomerate of the over-arching corporate organisation (kaiserpermanente.com, clevelandclinic.org, sutterhealth.org). Similarly, perhaps the most obvious and well-known example is a company website selling only company products, such as ikea.com, which limits the scale of choice only to 'Ikea' brand products.

Furthermore, one might observe the options on offer to be limited to particular geographic or jurisdictional boundaries. In this case, the scale of choice is **geography / jurisdiction**. For example, vitals.com enables users to compare and rate health services within the United States. In a similar way, nhs.uk/service-search only provides users to rate and compare health services in the UK. Finally, the options on offer might be provided through contractual arrangements. As a result, the scale of choice is **contractual**. For example, comparethemarket.com.au provides a contractual scale of choice because users are only able to compare between insurance providers that have a contract with the website. That is, users are not comparing between *all* insurance providers but rather only those that have 'signed up' with comparethemarket.com.au. However, it is noted that it may often be difficult to establish whether the options on offer are the result of contracts, because this information is not always freely or easily accessible (e.g., it might be disclosed in lengthy or complex legal documentation such as Terms of Service or End User License Agreements). The important aspect to capture is whether or not the scale of choice is shaped by contracts or legal agreements, which consumers may or may not be aware of.

4.3 Facilitating Choice

Choice involves making a decision between options or alternatives. As discussed in Chapter Two, the 'Facilitating Choice' dimension of the conceptual framework refers to the mechanisms, tools and functions that ToC websites provide users to enable them to compare between options and make informed decisions about the options on offer. In sum, this dimension focuses on how ToC facilitate users to compare and choose between different options.

This section examines how the findings from the website analysis were used to refine the Facilitating Choice dimension of the conceptual framework. A surprising discovery was the number and diversity of ToC that emerged in this dimension. Despite the relatively small sample size of websites (34 websites), there was considerable diversity in the way that users were facilitated to compare and select between the options, although clearly a number of dominant ToC were also identified (e.g., 5-star ratings and sortable lists). Overall, the website analysis captured five broad categories that define how choice is facilitated using ToC, which are listed below. Additionally, there are 25 features spread across these sub-dimensions. Whilst the five broad categories appear to be distinct from one another, in practice there is some degree of crossover given that they all relate to how choice is facilitated using ToC.

1. Characteristics of commensurability (7 features);

2. Presenting options (5 features);

3. Search functions (4 features);

4. Comparing individually (5 features); and

5. Personalising functions (4 features).

4.3.1 Sub-dimension 1: Characteristics of commensurability

Commensurability shapes choice by enabling people to choose between options in particular ways. This sub-dimension of Facilitating Choice examines what common attributes or characteristics options can be compared against one another. That is, how different options are rendered commensurable to enable users to make comparisons between them and in doing so classify options into, for example, ‘better’ or ‘worse’. Overall, seven different features in this sub-dimension were identified across the 34 websites analysed in Phase One of this study. These are listed below in order of most to least commonly occurring.

1. Rating;

2. Price;

3. Best-selling / popular;

4. Recency;

5. Relevance;

6. Location; and

7. Number of reviews.

Rating

Ratings are a longstanding tool of commensurability. A well-known example is movie and hotel ratings, which commonly use '5-stars' to rank films and hotels based on set criteria (Blank, 2007). Although ratings are examined in more detail in the 'Knowledge Production' dimension of the conceptual framework (see Section 4.4), people often associate ratings with '5-star ratings', which enable users to rate options on a scale of 1 to 5 and contribute to the overall 'official' rating for the option (e.g., product reviews on amazon.com). However, ratings can take a variety of forms, including '10 point' and '100 point' ratings, as well as 'unary ratings' and 'binary ratings'. In whatever form they take, ratings enable options to be sorted and ranked, using, for example 'sortable lists', and provide a powerful characteristic of commensurability that shapes choice.

Figure 4.3: Comparing between options based on their Rating (theverge.com)

Price

As the name suggests, Price enables users to compare options by monetary cost (Figure 4.4). Price is usually constituted as continuous data (i.e., sorted in ascending or descending order of price) but

sometimes also as interval data (e.g., $1,000 to $1,499). Almost all websites in the 'consumer' and 'commercial' categories utilised Price as a characteristic of commensurability (20 websites).

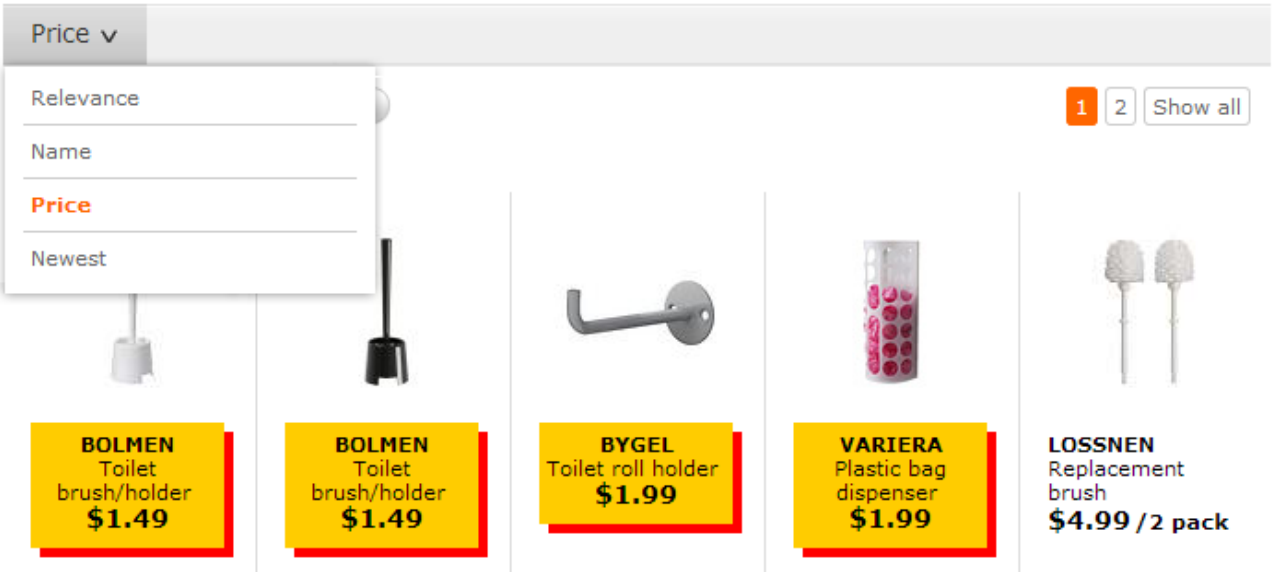


Figure 4.4: Comparing 'toilet' products by Price (ikea.com)

Bestselling / popularity

This feature refers to how options can be rendered commensurable according to how many other users have viewed or purchased them (i.e., number of page hits and number of purchases). This provides the ability to sort options by how popular they are with other users (Figure 4.5). However, this differs to ratings insofar as an option might be popular (i.e., many people are viewing it) or bestselling (i.e., many people are purchasing it) regardless of how highly it is rated. For example, at the time of writing this chapter, the book 'Allegiant' by Veronica Roth was ranked #4 on the Kindle best-seller list on amazon.com, despite only receiving an average of three stars out of five (after 8,241 reviews).

Figure 4.5: Sorting options by Best-selling / popular (walmart.com)

Recency

This features refers to the classification of options based on how recently they were added or released (e.g., the latest model cars on http://autos.yahoo.com - Figure 4.6). In this way, 'recency' imbues options with a characteristic that can be used to classify and differentiate them on a temporal basis, for example, 'new' or 'recently added'. This is useful because it enables users to easily locate and compare the latest options within a particular category of good or service (e.g., the most recently released Nike brand of jogger).

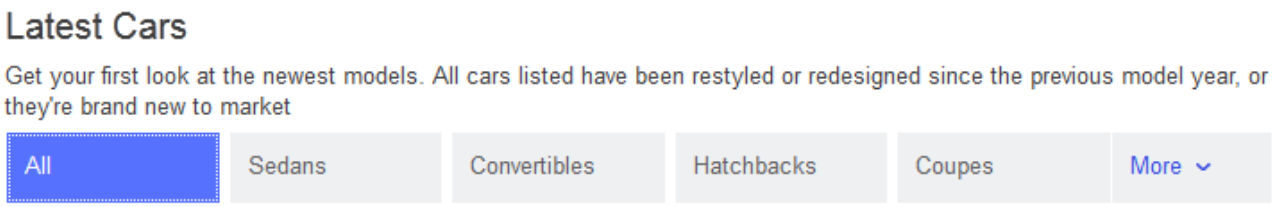


Figure 4.6: Comparing cars by Recency (http://autos.yahoo.com)

Relevance

The 'relevance' feature, also sometimes referred to as 'best match', 'smart sort' or 'smart filter', is useful because it enables users to sort and compare options based on a composite value of how relevant they are to the search terms inputted. This feature imbues options with a 'relevancy' characteristic that takes into account a range of factors and variables (Figure 4.7). Options can then be compared according to how 'relevant' they are for individual users. Although the specific approach to calculating 'relevance' may differ from one website to another (i.e., it is hidden from public view), factors that are often taken into consideration might include: similarity to search terms provided by user, option popularity, option rating, number of reviews, number of page views of option, to name a few. For example, kbb.com uses a 'best match' to "highlight the vehicles we think that you'll be most interested in viewing" by taking into consideration the quality and quantity of car information provided by sellers, the attributes of each vehicle, and the user requirements as provided in the search terms. Similarly, yelp.com is built upon a sophisticated and closely-guarded 'best match' filter for local businesses that may take into consideration aspects such as: proximity to user location, keyword-relevance, business categories specified, name of business, number of reviews, reviews by 'elite' members, and quality of reviews.

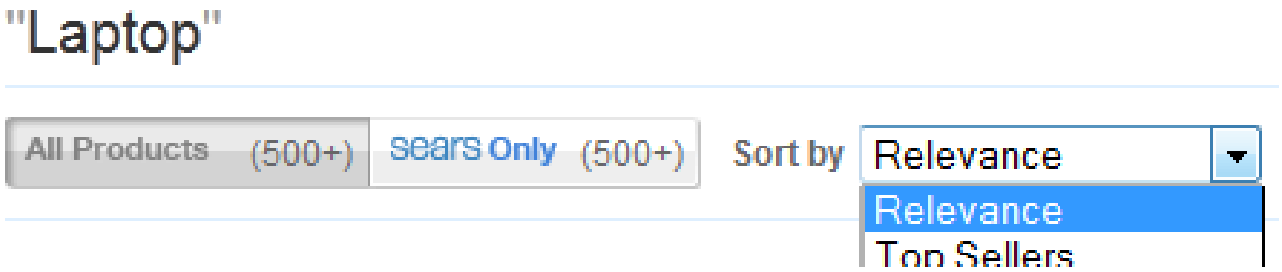


Figure 4.7: Comparing options by relevance (sears.com)

Location

This feature provides the ability to compare options based on their geographic proximity to a particular location (e.g., the user's location). For example, users on ebay.com can specify to view options that are located within 50km of their location, or sort a list of options according to geographic proximity to a postcode (Figure 4.8). Similarly, users of health websites can find nearby health services by specifying location or distance to a particular point of interest (e.g., public transport). In this way, the options on

offer are imbued with a personalised or tailored 'location' characteristic. This characteristic can then be deployed to render different options commensurable based on their location.

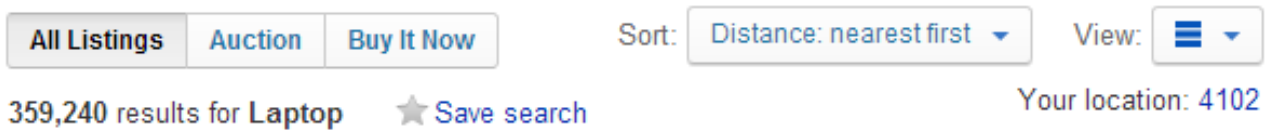


Figure 4.8: Comparing options according to location / distance (ebay.com)

Number of reviews

Number of reviews provides the ability for users to compare between options according to how many reviews or ratings have been received for each particular option. For example, yelp.com provides the ability to sort Chinese restaurants in New York City by how many reviews each restaurant has received on Yelp (Figure 4.9).

Figure 4.9: Comparing options by number of reviews (yelp.com)

4.3.2 Sub-dimension 2: Presenting options

As the title suggests, this sub-dimension focuses on tools and functionalities that enable users to visually compare between the options on offer. It examines how options are visually presented to the user on the screen, based on characteristics of commensurability, which in turn facilitate making comparisons between options. The features within this sub-dimension are listed below in order of most to least common and examined in further detail in this section.

1. Sortable lists

2. Filter by features

3. Featured

4. Side by side

5. Deals / specials

Sortable lists

Sortable lists present options in a list that is sortable (typically a vertical 'drop down list') based on characteristics of commensurability (see previous section). Sortable lists were the most commonly occurring feature of the 'Presenting options' sub-dimension. Almost all websites were observed to include this feature (30 websites). Figure 4.10 shows a typical sortable list on newegg.com.

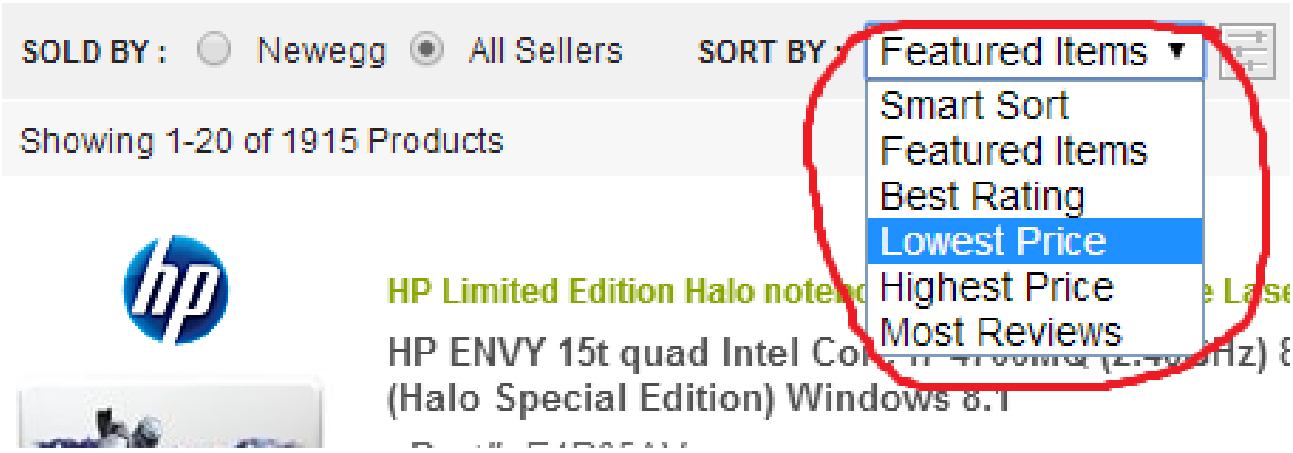


Figure 4.10: Presenting options using sortable lists (newegg.com)

Filter by features

Filter by features enables users to specify what kinds of features they are interested in (typically using checkboxes and radio buttons), delimiting the options on offer to a particular subset. This provides the ability to delimit or expand the scale of choice. An example is shown in Figure 4.11 taken from newegg.com (the image has been rotated), which enables the user to filter laptops by a range of features such as 'screen size', 'HDD capacity' and so forth.

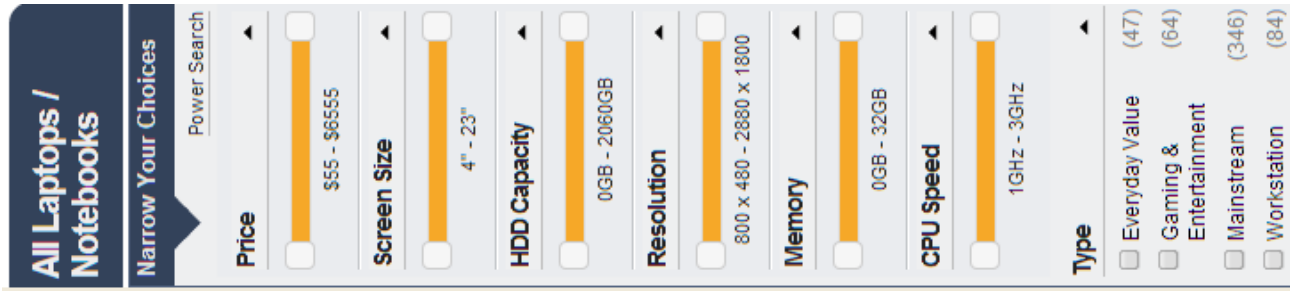


Figure 4.11: Delimiting the scope of choice using 'filter by features' (newegg.com)

Featured

Also sometimes referred to as 'top picks', this feature is used to designate options on offer that are deemed to be particularly important or noteworthy. Often the 'featured' options are designated by site administrators, however options might also be featured because they are recommended by 'experts', are popular with users (i.e., viewed or purchased frequently) or have received exceptional user-submitted ratings or reviews. The important aspect to consider is that 'featured' is defined by the *website operators*.

Side by side

Side by side provides the functionality to select two or more options and do a 'side by side' comparison, to compare and contrast particular characteristics or attributes of the options. This requires the user to select two or more options of interest and click 'compare' to generate a 'side by side' comparison. For example, target.com enables users to select options of interest and click 'compare' button to generate a side by side comparison (Figure 4.12). An important difference between this feature and sortable lists is that options presented side by side are not ordered but rather are self-selected by the user.

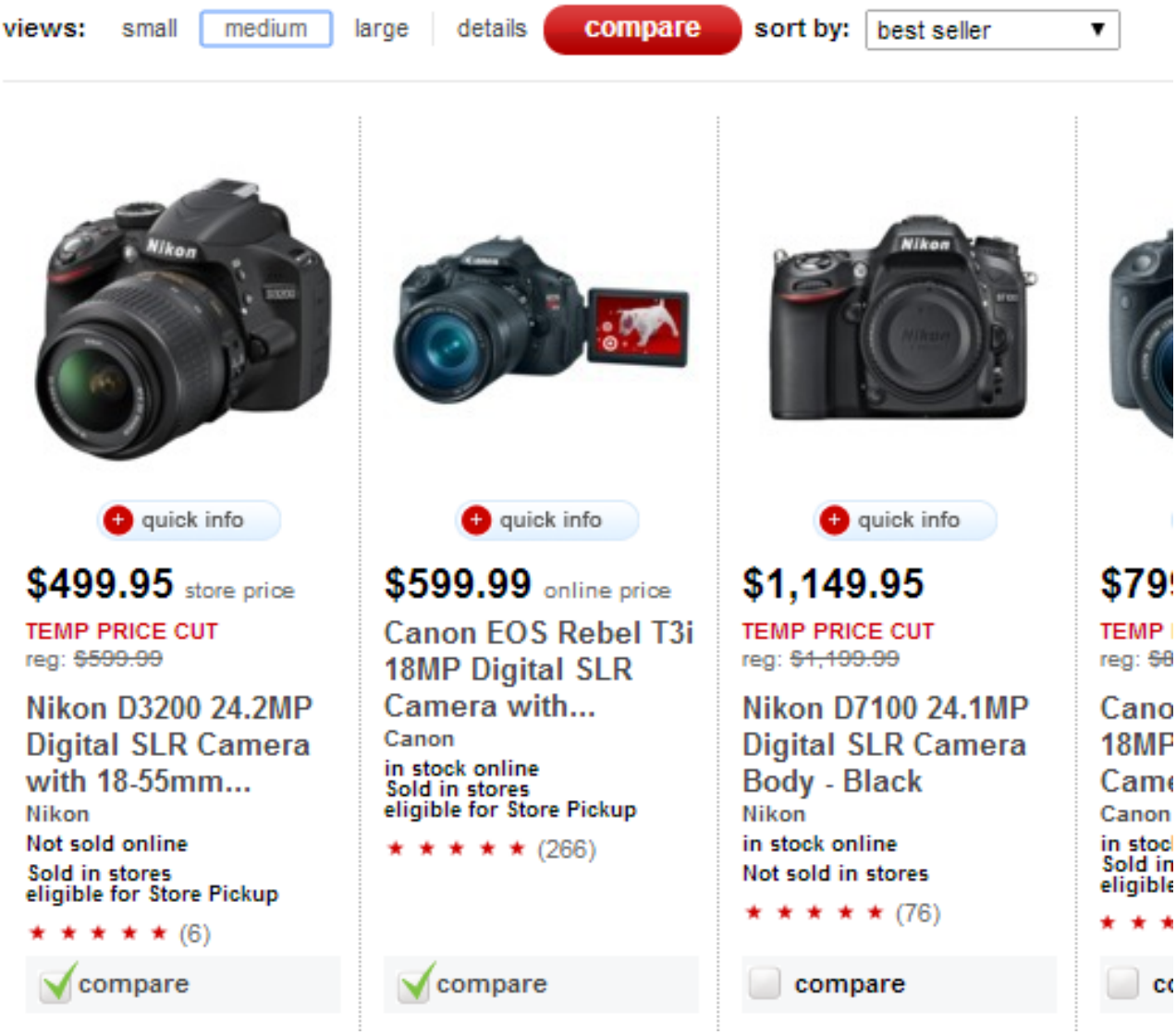


Figure 4.12: Comparing options side by side (target.com)

Deals / specials

Deals / specials provides users with the ability to differentiate which options are subject to discounts or 'special deals', which are controlled by the website administrators or sellers. Oftentimes, 'deals / specials' is a separate section, however it can also be integrated into other features such as sortable lists. That is, options are imbued with a characteristic that enables users to filter out options that are 'on special' or subject to a particular 'deal'. This characteristic can then be deployed to differentiate options based on deals / specials (e.g., the 'special buy' on walmart.com - Figure 4.13), thus presenting users with a subset of options that are 'on special' or subject to a 'special deal'.

Figure 4.13: Differentiating options using deals / specials (walmart.com)

4.3.3 Sub-dimension 3: Search functionality

Search functionality is a ubiquitous part of the web that we often take for granted. Most websites provide some form of search functionality, such as in-built search functionality or search engines powered by commercial providers such as Google. The decision to include Search functionality in the ToC conceptual framework was not straightforward. On the one hand, search functions do not adequately fit the definition of ToC used in this study; to argue that search engines provide a space where people compare and choose between different options requires a stretch of the imagination that does not capture the essence of ToC. On the other hand, almost all websites in the study included some form of search functionality, so clearly it is an important aspect that must be considered. Notably, there were two websites that did not have any search functionality at all, namely: comparethemarket.com.au and kbb.com.

Ultimately, this sub-dimension is included in the conceptual framework because it is clear that search functionality has a role to play in differentially shaping choice. In this way, the first action many users will perform with ToC is to input search terms into a search form, which is often centrally located in the website design. For example: the amazon.com homepage has a centrally located search form with the button “Go” which, once clicked, prompts users to ‘Select a department’ before they can use the ‘sortable list’ functionality; vitals.com contains very little textual content on the homepage except for a large search form; and shopping.com provides a centrally located search form which prompts the user with the text, ‘What are you shopping for?’. Thus, search functionality often provides a starting point for ToC, which shapes the list of options that users are presented with.

Standard search

Standard search refers to search forms that do not provide any corrections, feedback or suggestions as the user inputs text. Standard search forms simply reflect the exact input that users provide. One might argue that this type of search functionality has the least effect in shaping choice. That is, users are not directed or coaxed in any way by the search form (i.e., it does not provide feedback). At the same time, the presence of search functionality within a ToC website facilitates users to narrow down the field of options on offer within the web space, and therefore has a role in shaping choice.

Suggestive search

This feature refers to search functions that provide the user with a list of suggestions as they input text. There are broadly two ways in which this occurs. On some websites, suggestions are generated from what appears to be a discrete database of keywords. For example, users on makeupalley.com can search makeup by 'brand' by typing in the first few letters, presenting them with a list of brands that begin with those letters (i.e., typing 'Rev' brings up 'Reviva', 'Revive' and 'Revlon'). It is argued that auto-complete provides more potential for shaping choice than standard search because it provides feedback to the user to help them more easily find the correct search term. On other websites, suggestive search utilises algorithms that 'intelligently' predict what the user might be interested in, or provide corrections if a spelling error or mistake is detected. For example, Figure 4.14 shows how typing in the word 'bang' on Amazon generates a list of suggestions that *predict* what the user might be searching for, based on what other people have commonly searched for. That is, the search phrase is not merely auto-completed (i.e., by pattern matching the first few letters from a database of product names). Rather, the algorithm cross-references data from other users to predict and suggest search terms that might otherwise be non-intuitive or unknown to the user.

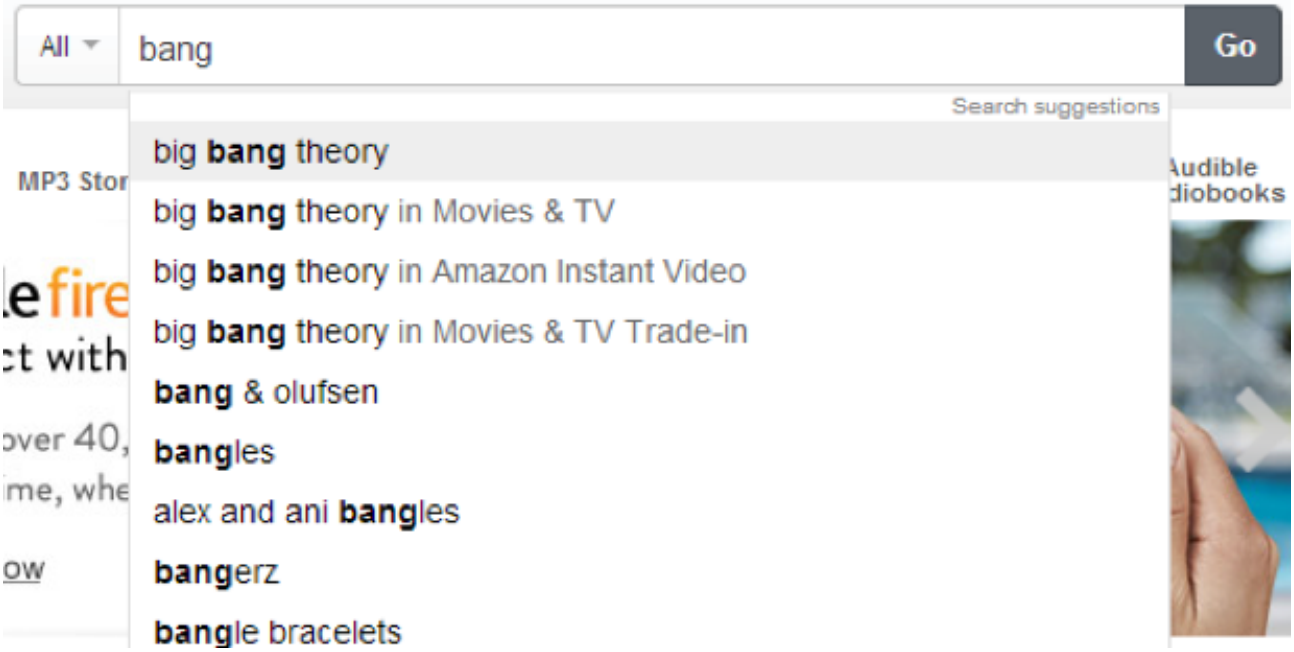


Figure 4.14: Suggestive search functionality on amazon.com

Search by category

Search by category refers to the ability to specify stricter search criteria when searching by name using standard or suggestive search functions. This feature narrows (or expands) the search functionality, for example, by enabling users to search by 'topic', 'type', 'brand', or even 'department'. In a sense, this feature shapes choice by pre-categorising the options on offer before the user types in their search query. In this sense, options on offer are differentiated by whichever category attributes they are assigned. For example, walmart.com provides the ability to search by department (Figure 4.15), which enables users to narrow the scope of search to particular categories (e.g., 'departments').

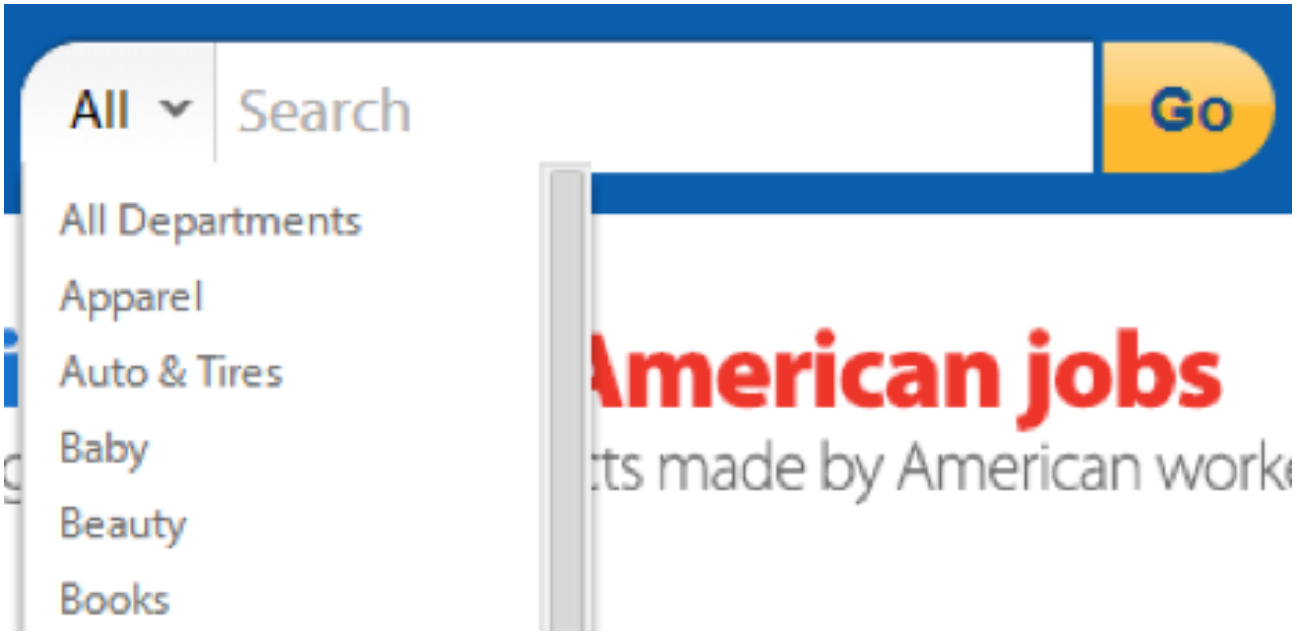


Figure 4.15: Delimiting the search results by 'category' on walmart.com

Search by location

This feature refers to the ability to narrow or expand the scope of options on offer according to a 'location' attribute. In this regard, options are differentiated according to their geographic location. For example, yelp.com requires users to specify both a search term and a location (Figure 4.16). This in turn shapes choice in a similar way to scale of choice (see section 4.2.2), although in this instance the user is in control of the 'scale' at which options are provided (i.e., users can switch between scales by simply specifying a different location).

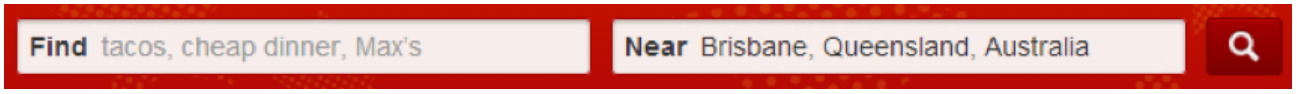


Figure 4.16: Delimiting the search results by 'location' on yelp.com

4.3.4 Sub-dimension 4: 'Comparing individually'

This sub-dimension refers to tools that enable users to 'plunge deeper' into the options on offer by examining a particular option or type of option in greater detail. In practice, this sub-dimension is largely concerned with the tools that are presented when a user clicks on a particular option, for

example to look at a product's 'profile page'. In this way, comparing individually enables users to indirectly compare 'between' options by examining the details of each option itself individually. This operates at the level of individual characteristics within options rather than an array of options presented together or alongside each other. For instance, rather than comparing a 'sortable list' of multiple different '3D televisions' across different brands and sizes, the 'comparing individually' sub-dimension provides a deeper examination of a particular brand or make of 3D television. For example, on target.com, one might sort a particular product's reviews by 'most helpful' to gain deeper qualitative information to inform their decision-making. Then the user might click on 'side by side' reviews, which goes a step further by enabling them to compare between reviews of that particular option (i.e., 'most helpful 4-5 star VS most helpful 1-2 star'). Finally, the user may decide to go back and compare between options (i.e., other brands of the same type of product), taking into consideration the information they gained at the level of comparing individually. In this way, comparing individually does not enable users to directly compare between options on screen. Instead, it provides detailed information about individual options that informs directly comparing between options using other ToC features.

Overall, there are 5 features in this sub-dimension, presented in order of most to least common:

1. Reviews;

2. Similar items;

3. Comments;

4. Customer Q&A; and

5. Customer recommendation.

Reviews

This feature enables users to sort through user-submitted reviews for an individual option or type of option in order to find the most 'helpful' reviews or to compare reviews side-by-side (reviews and ratings are terms that are sometimes used interchangeably because users will often provide a 5-star rating in conjunction with a written review). Although similar to ratings and sortable lists, this feature

differs because the user is not comparing reviews between options but rather comparing reviews within an option itself. Figure 4.17 demonstrates this using an example from sears.com. In Figure 4.17 the user is sorting the reviews of a particular option by 'Most helpful'.

Figure 4.17: Sorting through reviews by 'most helpful' review (sears.com)

Similarly, Figure 4.18 illustrates how reviews of a particular option can be compared side by side, for example on amazon.com where users can view 'helpful VS critical' reviews to compare the pros and cons of a product based on its positive and negative reviews. Once again, it is apparent that algorithms have an important role to play in calculating and processing the characteristics of reviews in order to facilitate choice. However, algorithms will not be further considered in this section but are examined in Chapter Six.

Figure 4.18: Comparing between side by side reviews of a book (amazon.com)

Similar items

This feature is conceptually similar to 'personalised recommendations', however this feature refers to the ability to view a list of items that are in the same (or similar) category to the item the user is currently viewing. Unlike 'personalised recommendations', this feature does not enable comparisons between options and does not take into consideration previous items the user has viewed or cross-reference against similar user's preferences. Rather, it generates a list of items that are in the same (or similar) current category or topic area of the item being viewed. This presupposes that each option on offer has a unique category that it can be classified into. For example, if a user is browsing a particular hair curler product (e.g., 'Caruso Hair Curler') on totalbeauty.com, this generates a list of similar products that are in the same category (i.e., 'Rollers, curlers' category). The 'similar items' feature makes use of the ability to attribute characteristics onto options by classifying them into categories.

Comments

This feature refers to whether or not users are able to post comments about particular options on offer, which includes posting text-, image-, and video-based comments. Comments differ to reviews because comments are very rarely directly comparable or sortable - they are deployed as a separate section on the individual page for a particular good or service on offer. For example, Figure 4.19 shows comments on theverge.com, which are simply listed in order of recency. The Verge does not enable users to submit reviews or ratings, so the comment section enables users to provide their opinions at the end of the 'expert' review written by the website operators. In this way, comments are included in the ToC conceptual framework because they clearly have a role to play in shaping choice, albeit in terms of the concept of 'comparing individually'.

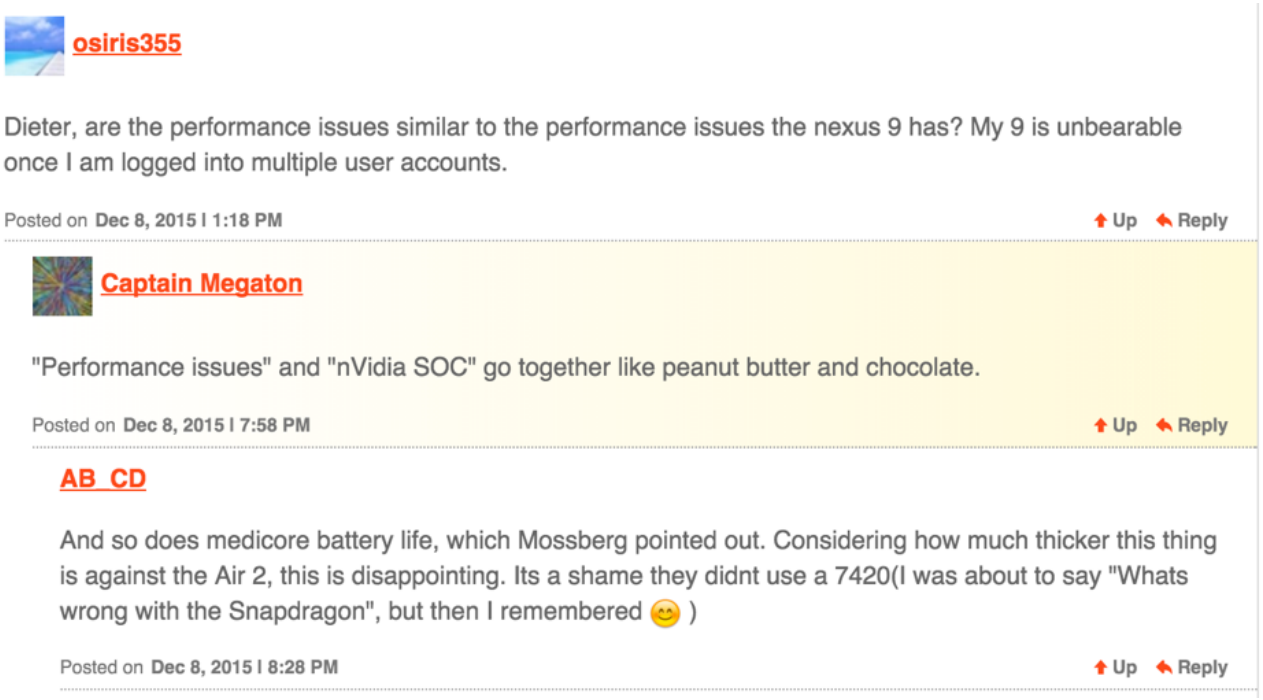


Figure 4.19: Comparing between side by side reviews of a book (amazon.com)

Customer Q&A

Customer Q&A provides the ability for users to ask questions about particular options, which are answered by other customers. In other words, this feature refers to how users are facilitated to directly communicate with one another in order to facilitate their decision-making about the options

on offer. For instance, walmart.com has a 'Q&A Exchange' that enables customers to post questions and answers for each product, e.g., "can I use earphones with this TV as I'm hard of hearing" (Figure 4.20). Whilst 'customer Q&A' is different from an internet forum or message board, it can sometimes resemble a forum-like layout (e.g., with 'posts' and 'threads'). However, online forums are not considered to fall within the definition of ToC and therefore 'customer Q&A' is considered separately from forums.

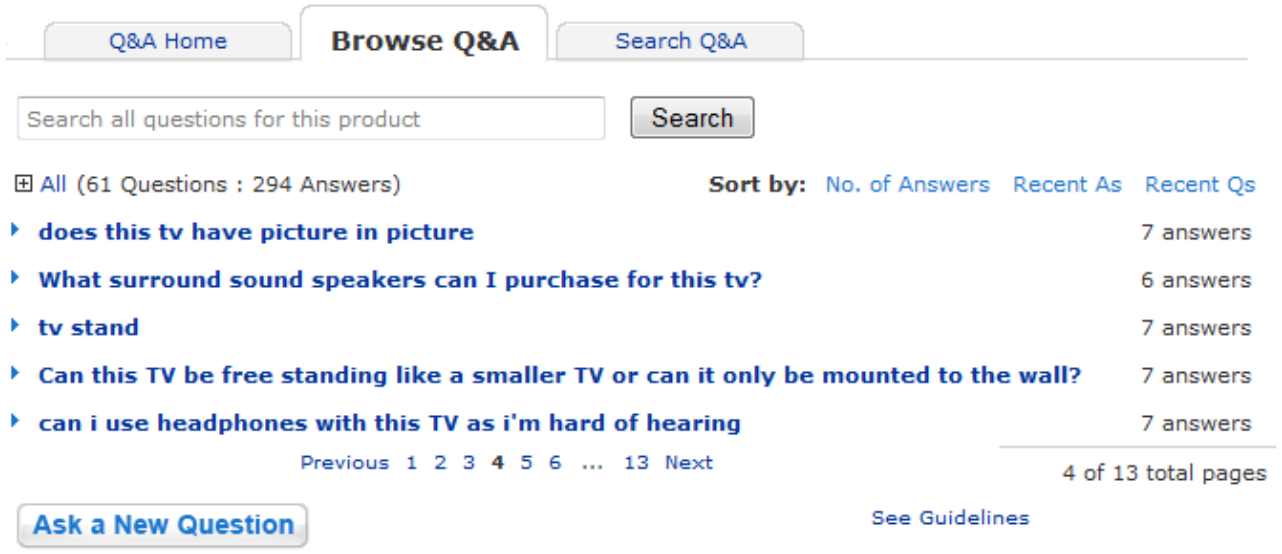


Figure 4.20: Facilitating decision-making with Customer Q&A (walmart.com)

Customer recommendation

This feature refers to the ability to gauge the extent to which other users would recommend a particular option (Figure fig:customer-recommendation). Customer recommendation enables users to specify whether or not they recommend a particular option on offer (e.g., a 'yes' or 'no' button), thus providing feedback which informs the decision-making of other users. This provides a percentage figure, often displayed in large text, indicating how many people recommend the option (e.g., '86% of people recommend this product' or '5% would buy again'). Therefore each option on offer gains an extra attribute that one might describe as customer recommendation. In this way, users can differentiate between options on offer by examining the sentiment of other people according to customer recommendation (i.e., the extent to which they recommend an option). Although this is similar to ratings, there is a key difference because 'customer recommendation' is essentially a

binary qualitative answer to a closed question; the user would either recommend an item or not. Thus, this feature is often displayed in conjunction with rating, but they are different features. Similarly, unlike ratings, this feature was almost always observed to occur only at the level of individual options (i.e., this characteristic is display only on individual product pages) rather than when comparing between options. It is not a characteristic of commensurability.

Figure 4.21: Gauging sentiment from customer recommendations (bestbuy.com)

4.3.5 Sub-dimension 5: 'Personalising functions'

People nowadays are accustomed to a 'personalised' experience using the web. websites utilise 'cookies' and online databases to store and deploy individualising data such as which pages you view most often, what sorts of products you tend to buy, which brands of devices and operating systems you use to access the Internet, what kind of ads you click on, your age, gender and geographic location, and so on. Moreover, the advent of Web 2.0 has enabled websites to be highly interactive and symmetrical in terms of information flow (Han, 2011). In addition, all of the user-generated data that are collected can be re-deployed using recommender systems (Herlocker, Konstan, Terveen & Riedl, 2004) that provide a sophisticated algorithmic approach to providing a personalised user experience. For example, amazon.com is renowned for providing useful product recommendations generated by algorithms that take into account a variety of user-generated data (i.e., 'Customers who bought X also bought Y'). Similarly, sites like Google and Facebook, whilst not ToC per se[2], serve up highly targeted advertisements based on topics related to who you are (personal profile information), what you tend to search for (e.g., football, knitting or baby food), what type of web content you read and publish, and even what kinds of messages (Facebook) or emails (Gmail) you send and receive.

[2]The rationale for why search engines are not considered as ToC is addressed in Chapter Three.

The Personalising functions sub-dimension examines how choice is facilitated at an individualised level. That is, the 4 features of this sub-dimension capture the ways in which users are able to compare between options and make decisions in a uniquely individualised way. The 4 features in this sub-dimension are presented in order of most to least common:

1. Transacting choice;

2. Personalised recommendations;

3. Personalised options; and

4. Live chat service.

Transacting choice

This feature refers to the ability for users to resolve their decision making process on the website, i.e., by purchasing a good or signing up to a service. That is, after comparing between the options on offer, the user is able to make and 'resolve' their decision. Thus, in a sense, the 'transacting choice' feature provides individuals with the means to commit their decision-making towards its terminus (what was chosen). In this way, users have not only compared between options, but also, through Transacting choice, acted upon this in a manner that is irreducible (insofar as the final 'click' in the decision-making process is irreducible beyond the 'clicker'). For example, a user may be comparing hotels in San Francisco on booking.com, identify an option that suits their requirements, and then 'transact' the choice by confirming the booking and paying for it online.

Personalised recommendations

The 'personalised recommendations' feature is positioned within the well-established field of recommender systems. Recommender systems (RSs) are software tools and techniques that use "the opinions of a community of users to help individuals more effective identify content of interest from a potentially overwhelming set of choices" (Herlocker, Konstan, Terveen & Riedl, 2004, p. 5). As will be shown in this section, the personalised recommendations feature is different to the 'similar items' feature because similar items relates to the characteristics of options whereas 'personalised

recommendations' relates to the characteristics of users and/or their online behaviour. However, the distinction between these two features is initially subtle, this section further explicates the difference.

There are two main sub-branches of RSs: 'collaborative filtering' and 'content-based' (Ricci, 2011). Collaborative filtering involves making suggestions based on a large pool of user-generated data, which "recommends to the active user the items that other users with similar tastes liked in the past" (Ricci, 2011, p. 11). On the other hand, content-based RSs focus more on the content itself; "the system learns to recommend items that are similar to the ones that the user liked in the past. The similarity of items is calculated based on the features associated with the compared items" (Ricci, 2011, p.11). Both of these approaches to RS relate to the Personalised recommendations feature of ToC, although in practice it is difficult to establish whether a website is using one or the other approaches, or both (i.e., a hybrid approach). For example, amazon.com provides personalised suggestions on every single page: 'Customers who bought X also bought Y' (Figure 4.22), which are generated using a RS that deploys privately owned and developed algorithms and data.

Similarly, users on ebay.com are presented with a large list of recommended products on the home page, titled 'My Feed', although it is not clear precisely how these recommendations are calculated. Likewise, bodybuilding.com recommends not only health supplement products but also exercise programs and equipment; presumably based off user profile data (i.e., body type, age, gender, fitness level) and browsing habits (i.e., which types of products the user tends to view and submit reviews for). However, Personalised recommendations can also be less sophisticated and more clearly identifiable as content-based RSs. For example, nhs.uk/service-search recommends 'Pages you might like' based on pages users have viewed in the past. Similarly, the yelp.com home page suggests popular or notable local businesses based on your geographic location. This heterogeneous array of RSs can be interpreted as ToC by examining them as personalised recommendations.

Figure 4.22: Personalised recommendations (amazon.com)

Personalised options

The 'personalised options' feature is conceptually quite similar to the process of receiving a personal 'quote' for a product based on personal needs and requirements. Rather than the user finding the right product, Personalised options means that the 'product finds you'. In this way, the products themselves are tailored to user requirements (i.e., by the user specifying their requirements or personal situation). For example, comparethemarket.com.au enables users to compare between insurance providers (among other services) by initially completing an online form that collects personal information about the user, their circumstances and requirements (Figure 4.23). After the form is completed, the personalised options feature generates a list of options that suit the personal requirements of the user.

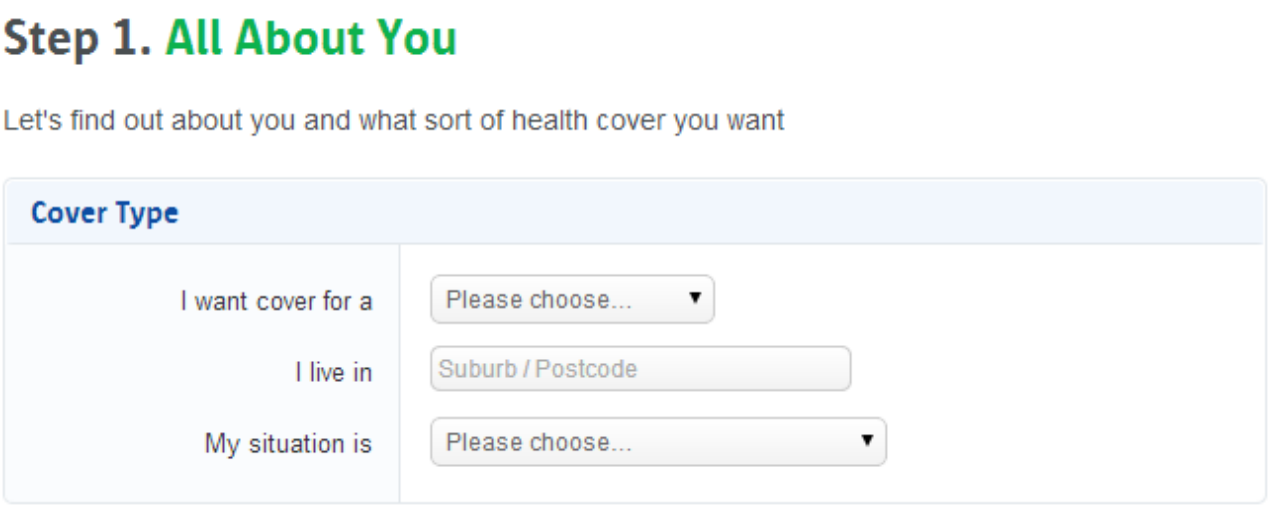


Figure 4.23: Personalised options (comparethemarket.com.au)

Live chat service

The 'live chat service' feature is similar to the 'customer Q&A' feature; however it is distinguished because the communication tends to occur in real-time (or close to real-time). In this way, users are able to seek immediate personal assistance to compare between options by communicating with, for example: other users (e.g., yelp.com, mouthshut.com), professional website staff (e.g., comparethemarket.com.au, kaiserpermanente.org), or even automated online assistants (ikea.com). Furthermore, the Live Chat Service does not include general customer support, technical support, or general enquiries. Rather, the focus is on functions that are typically ToC, i.e., the purpose of the Live Chat Service is to directly facilitate users to compare between options. That is, for a website to fall into this category there must be some clear indication that the primary purpose of the tool is to assist users to compare the goods or services on offer.

4.4 Knowledge Production

As discussed in Chapter Two, 'choice' involves making knowledge claims about the world around us. When confronted with different options, how do we know which one is better? Where does this knowledge come from and what forms does it take? Sometimes people do not wish to choose and may take whatever option comes first, the 'default' option, or perhaps even choose an option at

random (Sunstein, 2015). Most of the time, however, we tend to make informed choices. In this way, people draw upon information deemed reliable or trustworthy and act upon it vis-à-vis our personal circumstances - e.g., our preferences, habits, financial situation, emotional states, psychological disposition, intelligence, moral codes, beliefs, genetics, and so forth. With ToC, information about options is embodied and represented in the characteristics or attributes that are used to classify and differentiate options in order to make comparison possible (see previous section).

Lombardi (2004) argues that there are three different concepts of information: semantic, physical and syntactic. The focus in this research study is on the semantic conception of information, which "strongly links information to knowledge: information is essentially something capable of yielding knowledge" (Lombardi, 2004, p. 130). Indeed, as Kallinikos argues, "information is an epistemic category, providing the cognitive means on the basis of which reality is described, know, changed, augmented, or supplanted ... Information as semantic content can be seen as the upper level of the technological complex that marks our age" (2011, p. 4).

Information in the context of 'choice' can come from many sources, including for example: 'word of mouth', expert reviews, marketing and media, personal experience, value for money, popularity of products, instinct or 'gut feeling', religious beliefs and texts, statistical data, to name a few. All of these provide different information sources to produce knowledge about the options we are presented with and to constitute particular types of knowledge as more trustworthy than others (e.g., a friend's opinion versus a stranger's, or instinct versus statistical probability). In the context of choice, individuals are constantly engaging with, and constructing knowledge claims about, the world and the options it presents to them. 'Informed choice' is impossible without knowledge; knowledge depends fundamentally upon information. These concepts are intertwined.

How is knowledge about 'choice' constructed on the web? This question constitutes the focus of the 'Knowledge Production' dimension of the ToC conceptual framework, which maps and categorises how knowledge is constructed within three broad sub-dimensions: (1) 'types of knowledge' (i.e., how options on offer are represented digitally as 'knowable' entities); (2) 'sources of knowledge' (i.e., where knowledge comes from and how it is derived); and (3) 'Policing of content'. In Phase One it was found that the 'Knowledge Production' of ToC could be categorised into 3 sub-dimensions with various features within each:

1. Types of knowledge (9 features);

2. Sources of knowledge (3 features); and

3. Policing of content (1 feature).

4.4.1 Sub-dimension 1: Types of knowledge

This sub-dimension addresses the question of how options on offer are represented digitally as 'knowable' entities. For example, knowledge about books and other products on amazon.com is featured predominantly in the form of '5 star' nominal ratings / reviews. It is through these concrete socio-technical artefacts that users come to know whether, for example, Leo Tolstoy's War and Peace is a 'better' choice of book than E. L. James' Fifty Shades of Grey. In this study it was found that there are 9 different Types of knowledge that comprise the fundamental 'building blocks' for constructing knowledge about options on offer in ToC. In other words, these 9 Types of knowledge provide the basic tools for deriving and generating second-order characteristics of options on offer (e.g., 'top-rated', 'most popular', 'most helpful review'), which were explored in the previous section.

Although ratings are most commonly associated with '5 star' likert-scale ratings, ratings were observed to have a variety of types in respect to ToC, which are examined in this section.

Ratings *(nominal)*

Nominal ratings, such as the '5 star' likert-scale rating, are a long-standing tool of knowledge production that people are familiar with from traditional media sources such as movie and restaurant reviews in print media and television. In these more traditional formats, ratings normally reflect 'expert' opinions, for example movie critics or fine food connoisseurs. People generally trust such experts for authoritative information to inform their decisions. However, in the online world it is observed that knowledge constituted through ratings is not only derived from experts but more commonly by everyday people, i.e., web users with varying levels of expertise and experience.

A rating in the online world most commonly reflects the aggregated opinions a multitude of users. Indeed, this form of knowledge production is often construed as 'crowd sourcing' (Hammon and Hippner, 2012) or 'the wisdom of crowds' (Surowiecki, 2004), although this idea is challenged in the next section. For ToC, it is observed that users are able to gauge the quality or value of an option (i.e., a good or service) by referring to the number of 'stars' it has been given by other users. For example, Figure 4.24 illustrates a '5 star' rating of the popular 'Playstation 4' gaming console. In this example, the average rating is 4 out of 5 stars and this takes into account the opinion of 161 users.

Additionally, nominal ratings can be represented in other format, such as '10 point' ratings. The '10 point' style of nominal rating is conceptually analogous to '5 star' ratings, however the points are allocated on a scale from 0 to 10. Sometimes the rating is not represented by a 'star' symbol but rather a bar graph or a numerical value that calculates the average rating to one decimal place (e.g., 5.1 or 8.9). This contrasts with 5 star ratings, which tend to represent either integers or 'half a star' decimal values (e.g., 3.5 or 5).

Figure 4.24: '5 star' nominal rating of a private good (walmart.com)

Ratings ***(different characteristics or features)***

This feature refers to the ability for users to provide separate ratings for different characteristics of options on offer, rather than just one 'overall' rating. For example, target.com enables users to provide 3 different product ratings according to 'value', 'ease of use' and 'quality' (Figure 4.25); and gsmarena.com enables users to rate mobile phones by 'design', 'features' and 'performance'. Other websites provided more specialised ratings of different product characteristics, such as

bodybuilding.com, which enabled users to rate different flavours of bodybuilding supplements. Often, there exists a separate 'overall' rating for each option on offer, or the 'overall' rating is simply calculated as the average rating across all of the different aspects (e.g., 2 + 2 + 5 provides an overall rating of 3). It was found that half of all websites in the study (i.e., 17 websites) provided ratings for different characteristics or features.

In Figure 4.25 it is observed how goods on target.com can be rated according to particular characteristics, as well as the 'overall' rating. Interestingly, in this example the 'overall' rating for this particular product does not appear to be calculated as the average of the three ratings for different characteristics (i.e., 'easy to use', 'quality' and 'value). That is, the value of the 'overall' rating exceeds the average of the other three ratings, meaning that it is a separate feature.

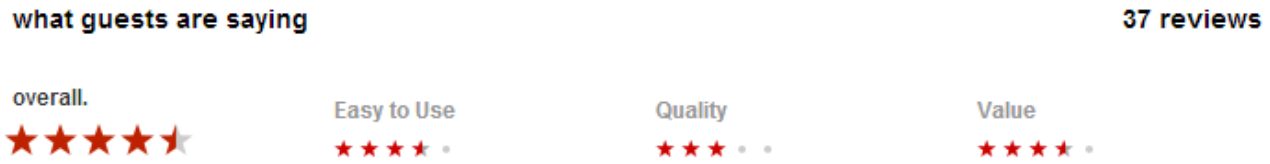


Figure 4.25: Ratings for different characteristics or features (target.com)

Ratings *(unary)*

On the web, unary ratings are popularly recognised as 'like' buttons (Sparling & Sen, 2011). This enables users to click 'like' on a good or service, which increases the overall tally of 'likes' for that particular option (i.e., '1001 people like this product'). These ratings are unary in the sense that there is no 'dislike' button—users either click 'like' or perform no action at all. Interpreted as ToC, unary ratings enable users to gauge the quality or popularity of an option by the number of 'likes' it has compared with other options. Interestingly, most of the websites in the present study provide unary ratings through Facebook integration. That is, the 'like' button itself is powered by Facebook but integrated into the website code; users needed to be logged into Facebook in order to 'like' the product or service on offer (Figure 4.26), but all users are able to see how many 'likes' a particular option has accrued.

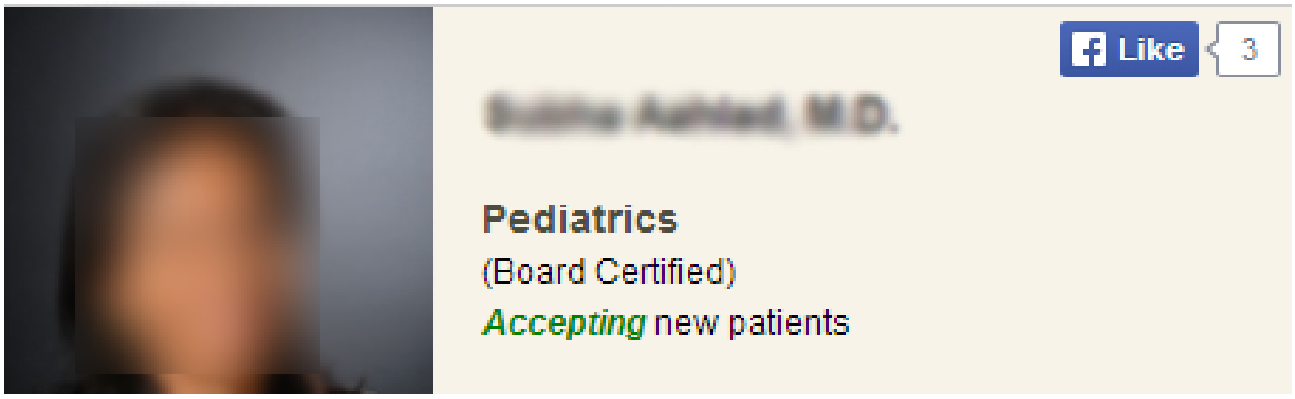


Figure 4.26: Unary ratings for doctor services (sutterhealth.org)

Ratings *(binary)*

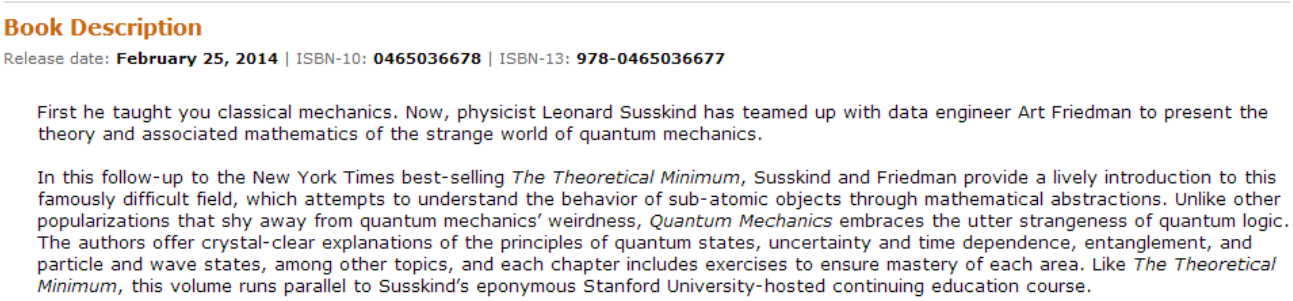
Binary ratings are conceptually similar to unary ratings, except that users are able to express both approval and disapproval towards an option on offer, for example by clicking 'thumbs up' or 'thumbs down'. Binary ratings can also be represented using 'yes' and 'no' buttons (e.g., recommending a product to other users or not) or 'upvote' and 'downvote' buttons. This feature is co-extensive with 'customer recommendation', which is essentially a binary rating because users can specify either positive or negative sentiment towards the option on offer.

Reviews

Although reviews and ratings are terms that are often used interchangeably, reviews are defined in this study as qualitative, text-based reviews. Reviews can vary in length from a sentence or two (e.g., mouthshut.com, drugs.com), to several paragraphs (e.g., yelp.com, nhs.uk/service-search), through to thousands of words (e.g., theverge.com) that can even span multiple pages (e.g., gsmarena.com). It is also noted that reviews often accompany ratings, for example on amazon.com where a user cannot submit a '5 star' rating without also submitting a text-based review. Hence there can be a degree of crossover between these two inter-related, although separate, ToC features. In this way, qualitative text-based reviews are often—but not always—accompanied by quantitative ratings, which taken together constitute the 'review' as a whole. However, the focus of this feature is the qualitative, text-based notion of reviews.

Textual description

This feature refers to the use of text to provide 'profile' information that describes details about the option on offer. In practice, this is most often observed as 'profile pages' for individual options on offer, which commonly use the 'official' description provided by the producer or manufacturer of a particular good or service. Textual descriptions also often includes static characteristics of the option on offer, such as 'release data', 'location', and unique identifier codes such as 'ISBN' or 'SKU number'. For example, Figure 4.27 shows a textual description of a book on amazon.com.



Book Description

Release date: **February 25, 2014** | ISBN-10: **0465036678** | ISBN-13: **978-0465036677**

First he taught you classical mechanics. Now, physicist Leonard Susskind has teamed up with data engineer Art Friedman to present the theory and associated mathematics of the strange world of quantum mechanics.

In this follow-up to the New York Times best-selling *The Theoretical Minimum*, Susskind and Friedman provide a lively introduction to this famously difficult field, which attempts to understand the behavior of sub-atomic objects through mathematical abstractions. Unlike other popularizations that shy away from quantum mechanics' weirdness, *Quantum Mechanics* embraces the utter strangeness of quantum logic. The authors offer crystal-clear explanations of the principles of quantum states, uncertainty and time dependence, entanglement, and particle and wave states, among other topics, and each chapter includes exercises to ensure mastery of each area. Like *The Theoretical Minimum*, this volume runs parallel to Susskind's eponymous Stanford University-hosted continuing education course.

Figure 4.27: Textual description of a private good (amazon.com)

Statistics (vis-á-vis 'population')

The analysis of websites suggested that statistics have an important role in knowledge production through ToC. This observation necessitates a brief discussion in this section in order to clarify a particular conceptualisation of statistics that produces knowledge about choice in relation to a 'population'.

Statistics are often held to obtain objective claims to knowledge about the world around us and the objects within it. Modern statistical reasoning is inextricably tied to the scientific method, which has become a powerful instrument for the construction of empirical facts since approximately the mid to late 19th century (Eves, 2002). As Desrosières (1998, p. 3) writes: "Statistics and probability calculus occupy an essential place among the tools for inventing, constructing and proving scientific facts, both in the natural and social sciences". For example, when people hear the latest national unemployment rate figures on the news they tend to construe such statistics as facts. However, Desrosières further argues that statistics are also political. Thus, the constructs that are measured statistically, the statistical methods that are used, the rationalities that are deployed, the

interpretations that are made, and so forth, are not separate to, but contingent upon, social and historical forces. Thus, the objectivity - or 'factuality' - of statistical knowledge is at once 'real' and constructed because it is constantly in the process of being both discovered and invented. As a result, statistics on unemployment rates are contingent upon such things as: what is defined as 'unemployed'; how the concept of 'work' is understood, who is authorised to undertake the statistical measurements; how the measurements are to be conducted (i.e., is the sample size representative and non-biased); why a particular phenomenon is being reasoned about statistically; and so forth.

Following this line of reasoning, it is argued that statistical knowledge about options in ToC is also inherently political in nature, which some argue is characteristic of all knowledge of the social world (Dominguez and Baert, 2012). Previously in this chapter it was observed how one way to compare between options is by comparing between statistical attributes in relation to a given population average. For example, the statistical performance of Australian schools (i.e., NAPLAN test results) can be compared on myschool.edu.au against the national average. This reflects a particular logic about how schools should be represented as 'knowable' (i.e., as statistical entities) and their embeddedness in a political context (i.e., education policy).

However, there is also an intimate epistemological relationship between statistics and algorithms, which has wide-ranging implications for ToC and also extends the notion and concept of a 'population'. For instance, in calculating how 'popular' a particular good or service is, this particular characteristic of commensurability must be compared against some 'population' average; more often than not in comparison to other products on the website (i.e., the 'population' of all products within the jurisdictional space of the website or network). Although the exact procedures of the algorithm are obscured from the user, by nature such algorithms are fundamentally statistical calculations. As a result, characteristics such as 'popularity' or 'relevance' are to be classified as statistical types of knowledge in ToC. For example, one could imagine a simple algorithm that calculates 'popularity' simply as the number of products sold. It does not matter whether a product has been sold one or one million times - what matters is how this figure compares in relation to the population average for products on the website. The key consideration is whether a particular characteristic or attribute of an option on offer is (1) constituted statistically; and (2) rendered meaningful in relation to some 'population' average (i.e., 'population' defined heterogeneously, as for example within the jurisdictional space of a website, or within a geographical area or state jurisdiction).

Similarly, the knowledge artefacts produced by recommender systems are also derived from statistical types of knowledge. As Gillespie writes: "When Amazon recommends a book that 'customers like you' bought, it is invoking and claiming to know a public with which we are invited to feel an affinity" (2014, p. 188). Hence, 'populations' of users on some ToC websites are statistically processed by algorithms into 'calculated publics' (Gillespie, 2014, p. 189) that produces knowledge about not only the options on offer but also knowledge about the users themselves (e.g., sub-groups of users who share an affinity for, say, 19th century Chinese romance novels with a strong female protagonist). What makes these algorithms political is that these automated statistical operations are not 'objective' or neutral but rather are highly socially constructed artefacts that reflect particular ideas and values.

Given the examples provided here, one might wonder how statistical knowledge about options on offer differs from 'ratings' as a type of knowledge in the ToC conceptual framework. That is, are ratings simply another type of *statistical* knowledge? A particular ontological distinction is drawn here based on the logic that a rating is an artefact of knowledge that is more coherently meaningful by itself - it does not *necessarily* need to be compared against some population average to be rendered meaningful. For example, if a model of laptop on theverge.com receives an expert rating of five stars (out of five), this suggests, or perhaps achieves, 'standalone' knowledge that the laptop is high quality. Perhaps this is due to the fact that ratings are a long-standing tool of journalism that people are familiar with as constitutive of knowledge. For instance, when a movie critic gives a film '5 out of 5', many people regard this as legitimate knowledge because it involves "careful expertise backed by a deeply infused, philosophical and professional commitment to set aside their own biases and political beliefs" (Gillespie, 2014, p. 181).

On the other hand, on the My School website in 2013, the school "Trinity College, Beenleigh, QLD" had a NAPLAN result of 572 in the category "reading" for Year 9 class. By itself, this statistical attribute is not meaningful because it is unclear whether a result of 572 is "good" or "bad". However, compared against the national average across all Australian schools (i.e., 580), this result is observed to be 'close to' the national average. Hence, this is statistical knowledge, which is regarded as ontologically separate to ratings. Overall, it is noted that the categorical distinctions drawn in this study represent only one conceptualisation of how knowledge is constructed on the web through ToC. These categories are not universal and are set forth here as one possible way to delineate and cohere knowledge production for ToC.

Images

It is often said that 'a picture paints a thousand words'. Indeed, visual imagery is a powerful medium for communication and information and has remained so since the beginning of human history. Nowadays this is no less true for the web and for ToC in particular, where knowledge about the options can be powerfully shaped by imagery. For example, customers on homedepot.com can get an idea of what a particular type of kitchen bench would look like in their home by viewing the photos uploaded by other users (i.e., rather than reading a textual description of the product or looking at 'stock' photographs of the products on offer). Similarly, users of yelp.com can look at photos submitted by other users, such as photos of dishes served at local restaurants or photos of local parks. On ebay.com, users are not permitted to create auctions that do not contain a photo of the product being sold (Ebay, 2014). Hence, the images feature refers to knowledge about options on offer that is constructed in the form of visual imagery, such as photos, diagrams, and pictures.

Videos

Video is a powerful and pervasive form of information storage and consumption, dating back to the 1930s with the invention of Kinescope by General Electric (Ellis, 2013). Nowadays, the advent of broadband internet and social media websites such as YouTube has engendered an explosion of videos throughout the web, ranging from Hollywood trailers to home-made videos to product commercials and much more. A telling statistic is that 100 hours of video are uploaded to YouTube every minute (YouTube, 2014). Given the proliferation of video on the web, the focus of the videos category in ToC is to examine how knowledge about options on offer is shaped by videos. Concretely, this includes video reviews (e.g., amazon.com), product information videos or clips (e.g., walmart.com), or even animated 'gif' images. This feature also refers to videos relating to broader types of options rather than particular options themselves. For example, the "Things to know before you buy" videos on bestbuy.com provide information about types of products (e.g., TV types) rather than individual products themselves (Figure 4.28). In summary, this category refers to any moving image that relates to producing knowledge about the options on offer in ToC.

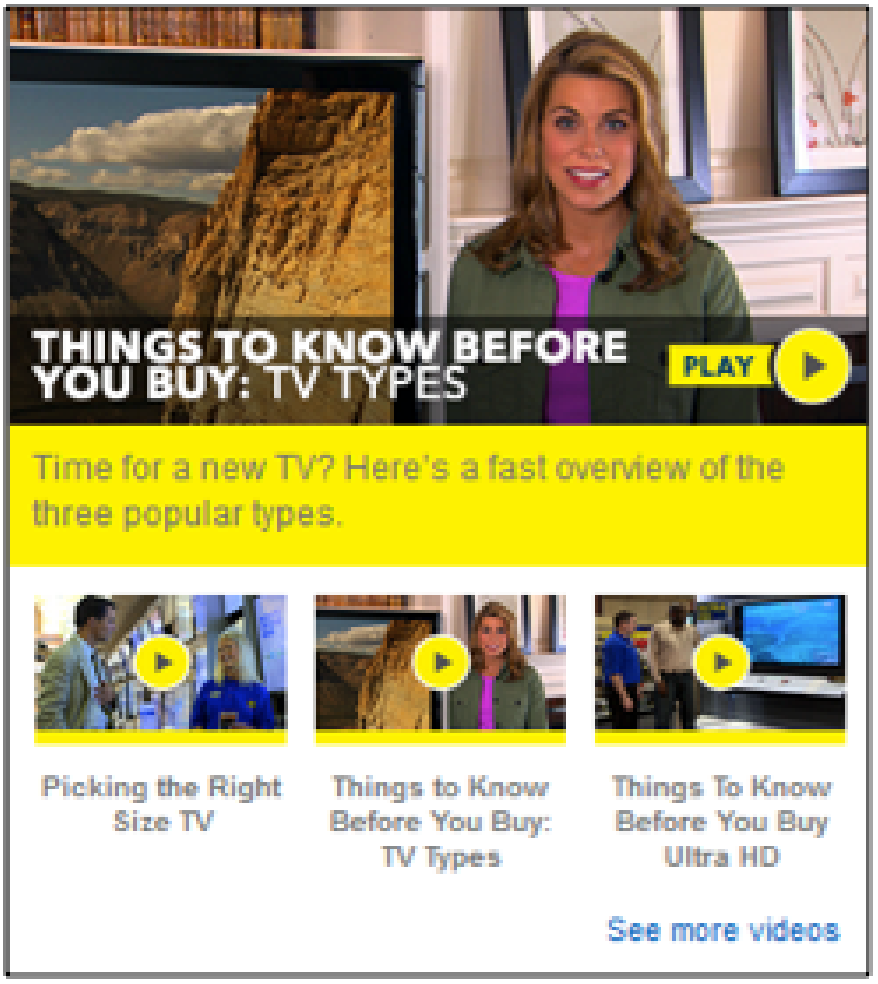


Figure 4.28: Videos as a 'type of knowledge' (bestbuy.com)

4.4.2 Sub-dimension 2: Sources of knowledge

The 'sources of knowledge' sub-dimension addresses a key question that follows from the previous section, namely: where do the types of knowledge come from? For example, drawing on the earlier example of ratings on amazon.com it is further observed that '5 star' nominal ratings of products are generally not produced by experts or authorities, but rather from 'crowd sourcing' the collective wisdom of everyday users (Hammon and Hippner, 2012). In this way, any person can register an account with amazon.com and contribute their own knowledge about a particular product by submitting a '5 star' rating (which in Amazon's case also requires submitting a 'review'). Indeed, Blank identifies 'source of knowledge' as a characteristic of the different 'routes to credible knowledge' that reviews can take (2007, p. 152).

Thus the 'sources of knowledge' sub-dimension can be considered as a 'shadow side' to the 'types of knowledge' sub-dimension. In a sense, these sub-dimensions represent two sides of the same coin, given that one cannot exist without the other. For example, a '5 star' nominal rating/review on amazon.com is an empty vessel devoid of knowledge until it is 'filled up' with at least one user's opinion. Conversely, if a user wants to provide their opinion about a particular book on amazon.com, they can only achieve this by submitting a '5 star' rating / review. However, throughout the website analysis it was also observed that ToC websites such as theverge.com provide '5 star' ratings of products that are produced by *experts*. In this case the source of knowledge does not come from everyday users but rather 'experts' or 'connoisseurs' (Blank, 2007) who are directly invited/employed by the website operators. As a result, two seemingly identical '5 star' ratings on different ToC websites can in fact be produced by—or 'filled up' with—knowledge from two fundamentally different sources (e.g., the collective wisdom of thousands of users versus the opinion of a single individual expert).

As a result, when examining each of the types of knowledge it is also necessary to also examine where the sources of knowledge derive from. That is, for every type of knowledge there also exists a source of knowledge. Overall, it was found that there are three main sources of knowledge in ToC (presented below in no particular order). Each of these will be examined in this section and illustrated with examples from the website analysis.

1. Users

2. Website operators / experts

3. Institutional authorities

Users

This category refers to ToC websites that feature knowledge about the options on offer produced by 'everyday' users (i.e., not necessarily experts or administrators of websites). Users as a source of knowledge epitomises the notion of Web 2.0, whereby information flows are multi-directional in the user-led content-creation environment of the contemporary web. This phenomenon has been variously described in the literature as 'produsage' (Bruns, 2008a; 2008b), 'crowd sourcing' (Hammon and

Hippner, 2012) and 'the wisdom of crowds' (Surowiecki, 2004). The role of this feature in the ToC conceptual framework is to be able to further differentiate types of knowledge by examining whether the source of knowledge derives from everyday users. This can help to understand the complex ways that knowledge is produced on websites when there are a variety of actors with varied interests and goals at play (e.g., on amazon.com between company shareholders, customers, technical engineers, managers, and so forth). Rather than rehearse the entire findings of the analysis, this section draws on several key examples to provide further illustration.

Reviews

As previously discussed, reviews are defined in this study as qualitative text-based reviews of options on offer, although reviews are often accompanied by nominal ratings. This is often the case in relation to reviews produced by users, as illustrated in Figure 4.29 below. Figure 4.29 provides an example of a 'customer review' on amazon.com, which provides the ability for users to provide their own feedback about the options on offer. In this example, the user is required to provide a textual review in order to also submit a rating (i.e., in the form of a headline/summary and a main text review).

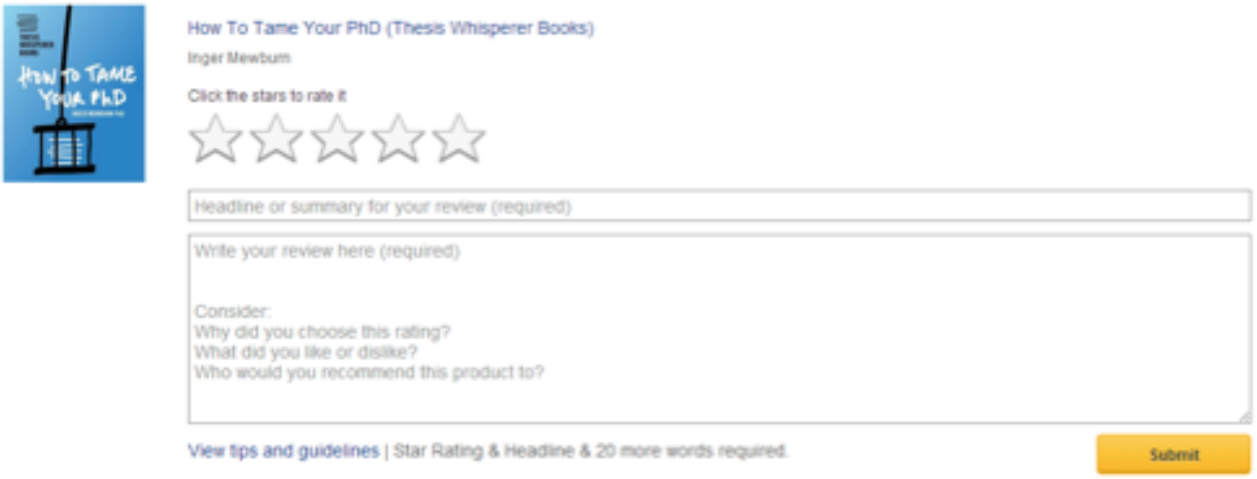


Figure 4.29: User reviews (amazon.com)

Images

This feature examines whether *users* are able to co-shape knowledge about options on offer by uploading images. For example: yelp.com provides the ability for users to upload photos of meals, drinks and décor at local restaurants (Figure 4.30); ebay.com enables users to upload photos of

products they wish to sell; and homedepot.com enables users to include photos in product reviews. If the landscape of choice presented by the website is shaped by images that are posted or produced by regular users (not just website operators), then the conditions of this feature are met. However, the boundaries of what types of images are permissible for users to produce or post vary from website to website. This is interesting in itself because it demonstrates how, if given permission to produce images, users might often be quite creative, push the boundaries, or do unexpected things. For example, on ebay.com people might post humorous images to sell products (Figure 4.31).

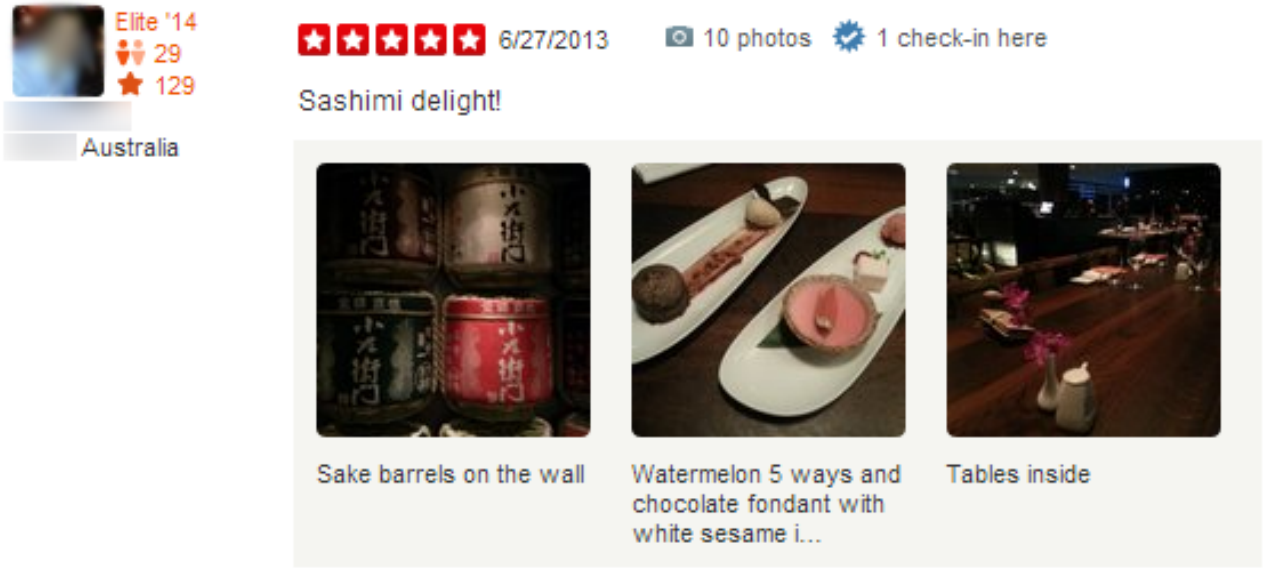


Figure 4.30: Images produced by users (yelp.com)

Figure 4.31: Unexpected user behaviour to convey information about options on offer (ebay.com)

Website operators / experts

This category refers to types of knowledge that are derived from the website operators or individuals who are authorised by the website to provide 'expert' knowledge about the options on offer. There is arguably a distinction to be made between 'website operators' versus 'experts'. However, in practice there is considerable crossover because: (1) often the website operators will be the 'experts'; and/or (2) the distinction between website operators and 'experts' is not made clear or visible on the website. In general, what is important to capture is whether a given ToC website features knowledge that is produced by those who operate or administrate the website, including sanctioned individuals who provide a kind of 'expert' knowledge of the options on offer. This is briefly illustrated in respect to two types of knowledge, 'reviews' and 'images'.

Reviews

One of the websites analysed (dogfoodadvisor.com) was observed to provide thousands of dog food reviews written by Mike Sagman, who is an authority on reading and interpreting pet food labels. Dogfoodadvisor.com enables users to compare dog food brands to make informed choices. In terms of knowledge production, this means that the source of information and therefore knowledge about options on offer (i.e., dog food brands) is obtained through an expert authority (i.e., an expert on dog food labels who also happens to be the website owner). Similarly, on gsmarena.com, reviews of mobile phones are authored by the "GSMArena Team", but also by guest experts who are employed/invited to write reviews for the website. These two examples illustrate the ambiguous nature of this source of knowledge, given that it is not always clear or straightforward to delineate the difference between website operators and experts on the website. However, knowledge derived from this source is clearly different from knowledge derived by 'users', and the conceptual framework seeks to capture this difference.

Images

Throughout the analysis it was observed that images are often produced by the website operators, rather than images produced by users. Some websites, such as cnet.com, feature images about the options on offer that are produced only by the website operators (cnet.com review contain images produced by official 'CNet editors'). However, it is also observed that images are able to be produced

by both ‘users’ and ‘website operators / experts’. For example, bestbuy.com contains ‘official’ images of products produced by the website, but also images produced by users and included in their reviews).

Institutional authorities

Throughout the analysis, another source of knowledge in ToC websites was observed that could be broadly conceptualised as deriving from institutional authorities. This source of knowledge is differentiated from that of ‘users’ and ‘website operators / experts’. Institutional authorities in this study are defined as any organisation or authority (typically—but not always—non-commercial and/or non-government) that conducts and provides independent research relating to options on offer in ToC. For the websites analysed, the ‘institutional authorities’ source of knowledge was typically associated with two types of knowledge: ‘statistics (vis-á-vis ‘population’)’ and ‘textual description’. To illustrate this further, these are used to provide an example of knowledge produced by institutional authorities.

Statistics

When comparing between health services on nhs.uk/service-search, it was observed that the Portsoken Health Centre has a score of 73.7% for ‘Would recommend the surgery’ (Figure 4.32). This ‘key fact’ is categorised as statistical type of knowledge in the ToC framework. Yet where does this statistical knowledge come from? Upon further examination it is observed that this particular statistic is derived from a national survey study conducted by the Picker Institute Europe, which is a not-for-profit organisation. Similarly, for comparisons between schools on myschool.edu.au, statistical knowledge about schools is based on ‘NAPLAN’ data produced by ACARA (Australian Curriculum, Assessment and Reporting Authority).

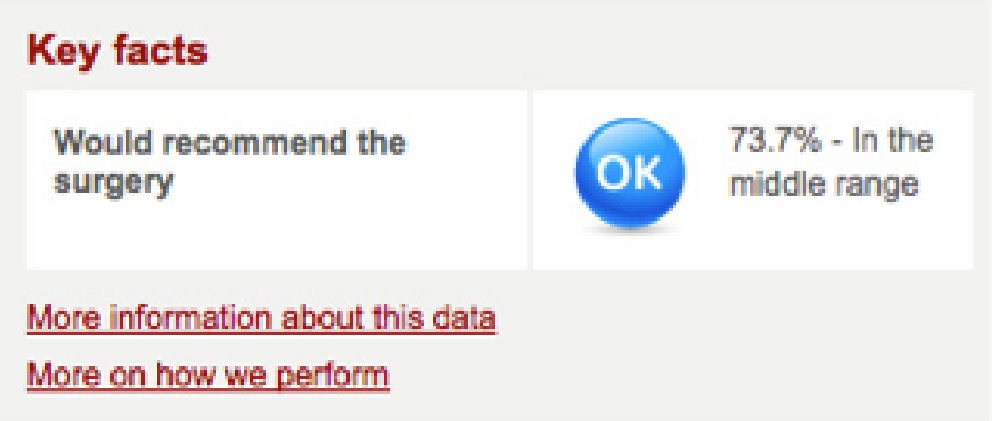


Figure 4.32: Statistical knowledge sourced from institutional authorities (nhs.uk/service-search)

Textual description

The website drugs.com provides very detailed textual descriptions of pharmaceutical drugs, providing knowledge that people can use to compare between drug options. For example, there are 104 side effects listed for consumers of the drug Viagra[3]. However, where does this knowledge about Viagra derive from? Upon further examination it is observed once again that the source of knowledge is an institutional authority. In this example, information about drugs is produced by the organisation Cerner Multum, written by "full-time associates who have no affiliations with drug companies, using a combination of sources" and peer-reviewed by independent specialists and an expert review panel[4].

4.4.3 Sub-dimension 3: Policing of content

Another way in which knowledge is produced through ToC websites is by enabling users to 'police content', for example 'flagging' fraudulent reviews (Figure 4.33 or notifying website administrators about suspicious options on offer (e.g., 'scam' services or counterfeit goods). The deployment of this feature within a ToC website accords with Bruns & Schmidt's (2011) notion of 'produsage' environments (as argued previously), in the sense that users are configured to co-police the web space alongside website administrators or operators. This suggests that the problem of how to 'police' ToC websites is commonly configured as a 'produsage' process — website operators cede a

[3] See http://drugs.com/sfx/viagra-side-effects.html
[4] See http://drugs.com/mtm/

certain degree of curatorial control over to the general population in order to govern flows of information that converge and are presented within the web space.

Figure 4.33: Policing content by 'flagging' user-submitted reviews

4.5 Configuring Users

As discussed in Chapter Two, it is evident that the design of ToC websites may 'configure' users by not only presupposing or defining who and what they are, but also establishing parameters that shape the kinds of actions that users can undertake. This aspect of ToC is conceptualised by drawing on Woolgar's notion of 'configuring the user' (1991), meaning the way in which technologies 'configure' users to act in particular ways, and simultaneously presuppose how such technologies should be used. In this section I develop this dimension of the conceptual framework in more detail in relation to the website analysis. As a result of this analysis, two new 'sub-dimensions' were created, namely 'Individualisation' (4 features) and 'Networked Publics' (4 features).

4.5.1 Sub-dimension 1: Individualisation

In developing the 'individualisation thesis', Beck (1992) and other scholars describe contemporary social transformations in which the individual becomes the core unit of social life, brought about by the breakdown of tradition alongside processes of structural fragmentation that contribute to the formation of highly individualised and reflexive subjectivities (Beck, 1992; Beck & Beck-Gernsheim, 2002; Bauman, 2000; Giddens, 2001). In summarising the commentary on individualisation, Howard argues that "the contemporary shift toward the individual is being driven by collective processes that involve new forms of socialisation, regulation, and resource allocation, all of which promote particular kinds of individuality" (1997, p. 1). The concept of individualisation is useful for capturing the way in which ToC websites appear to configure users to act and experience themselves as individuals. A broader

observation is that the majority of websites analysed in this sample appeared to configure users-qua-individuals as a key part of the infrastructure of the site itself, and in respect to ToC, as a fundamental component of the everyday functioning and maintenance of the landscape of choice presented in each web space. This appears to be achieved, at least in part, through processes of individualisation that configure users to experience themselves as individuals with unique profiles and self-reflexive actions.

User accounts

Prior to the onset of Web 2.0, the ability to have a 'user account' with a website was relatively novel, as the technical infrastructure required to build and support this kind of feature in web design was not trivial. However, as software and hardware infrastructure became cheaper and easier to install and maintain, companies and organisations began to incorporate user accounts into their website design in order to provide individualised services, merge software applications with web interfaces, facilitate e-transaction capabilities, foster an online user-base, and more. Nowadays, user accounts are so common that they seem somewhat mundane, or have perhaps become largely invisible elements of the web. This is certainly the case for the websites examined in the study sample, where all but three enable users to have their own account.

Although user accounts may seem like an inconsequential design feature, they are important because they provide a necessary foundation for users to participate in the web space as unique individuals with a logic of permanence (i.e., their details and activity in the web space are not ephemeral, but are stored and reproduced through database systems). In this way, the user establishes a codified relationship with the web space, which finds a locus of coherence in their individual user account. As we will observe later in this section, the ability to log in using social media profiles (e.g., Facebook and Twitter) further reconfigures and complicates the role of user accounts.

Profile details publicly visible

In the case where a given ToC website includes a 'user accounts' feature, the next question is whether or not user accounts have an associated 'public profile' that displays personalising information to a wider audience. For example, Figure 4.34 shows the profile details of one of the top reviewers on

Amazon. Individualising details include the person's name, their location, a personal photo, an 'about me' biographical blurb, statistical details about their activity (e.g., how helpful they are, current rank, number of reviews), and some example extracts of recent reviews. Profile details also often include what the user has purchased or places and services they have 'checked in' at. Thus, users enact choice through the website and their decisions are then publicly displayed on their profile, linking the user back to their decisions ("I chose this Italian restaurant"; "I chose these Nike shoes"). In this way, there is clearly a 'self-reflexive' logic to publicly visible profile details, because activity conducted within the site (e.g., reviewing) is tied to, and actively contributes to producing, an individual self within the web space that is visible and accountable to others, to a greater or lesser extent. This suggests a kind of socio-technical 'reflexive biography' (Beck & Beck-Gernsheim, 2002) that harkens to the individualisation thesis. By the same token, the amount and type of publicly visible profile details differs from one website to another. For example, target.com only displays the city and state where the user resides, and bodybuilding.com focuses on a range of statistical data about the body (e.g., height, weight, body fat).

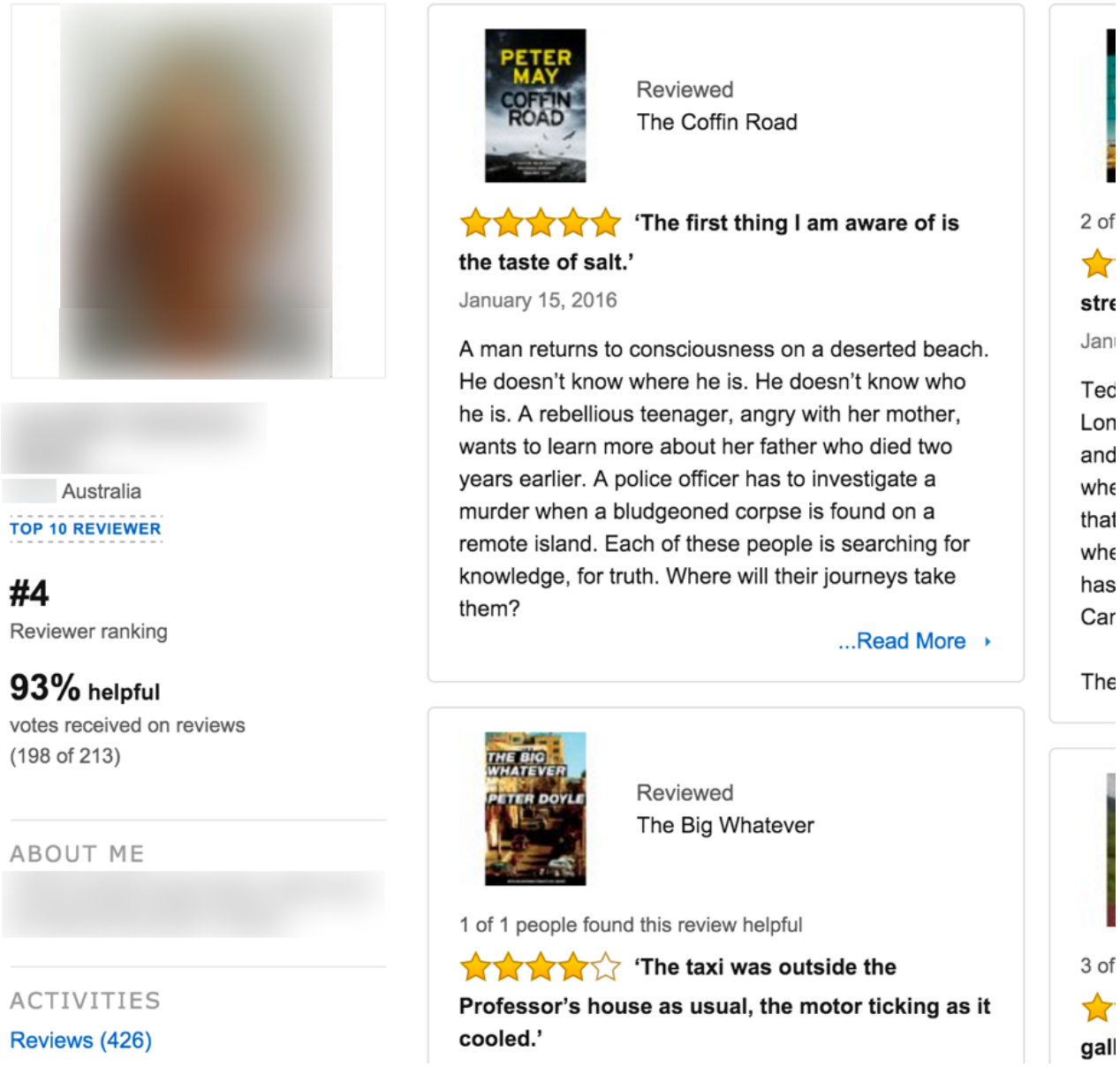


Figure 4.34: Publicly visible profile details on Amazon

Badges / levels / achievements

This feature seeks to capture how users are configured to be able to earn badges, achievements, or different levels for activity conducted within ToC websites. For example, Figure 4.35 shows the 'expertise badges' earned by the user *boju*, as well as publicly visible profile details. These types of web-based reward schemes have recently been conceptualised in the literature in terms of 'gamification'. Richter et al. provide a definition of gamification as "the use of game elements in

non-gaming systems to improve user experience and user engagement, loyalty and fun" (Richter, Raban, & Sheizaf, 2015, p. 21). Gamification reconfigures and imbricates the intrinsic motivations of users (e.g., reviewing computer technologies because of personal interest) with extrinsic rewards that provide a sense of progress and self-advancement (e.g., gaining more expertise badges).

Figure 4.35: Badges and achievements: gamification and affective rewards on Tom's Hardware

Ekbia and Nardi reason about the 'affective rewards' that these types of systems produce, arguing that users and enterprises both benefit from this socio-technical configuration, although they note that benefits are asymmetrically weighted in favour of enterprises because the latter stand to gain an unequal amount of benefit from this relationship (2014, Section 1.2). These gamification processes appear to shape and drive knowledge about choice by configuring users as instruments of knowledge production (e.g., generating ratings and reviews). Indeed, Antin and Churchill argue that 'badges' have five broad psychological functions, which accord with the notion of 'affective rewards'. In particular, one of these functions is 'Instruction', which "provide[s] instruction about what types of activity are possible within a given system" (2011, p. 3). In this way, the use of badges, levels, and achievements on ToC websites may not only configure users towards gamification processes, but also configure their intended role and use of the site.

User account verification

Throughout the analysis, an interesting observation was that a number of websites enabled user accounts to be *verified* as to whether they are 'really' who they are, or have 'actually' purchased a particular good or service. For example, Figure 4.36 shows the *Verified Purchase* label on an Amazon user review, indicating that the user has actually purchased the book they are reviewing. Similarly, the *Real Name* tag on Amazon denotes that the user is reviewing 'as themselves' and has verified their personal identity. As Bell argues, this builds a sense of reviewer trust, suggesting that 'verified' reviews attract higher ratings from other users (Bell, 2009, p. 62). Jeacle and Carter (2011) examine the importance of 'trust' for the functioning of ToC websites, using Trip Advisor as a case study. Drawing on Giddens, Jeacle and Carter argue that such websites constitute abstract systems, whereby calculative practices are deployed to establish and maintain trust in the absence of traditional face-to-face interactions with expert systems and agents (2011). For example, Jeacle and Carter explain how TripAdvisor requires reviewers to register their personal details with the website, and do not allow commercial email addresses to be used (2011, p. 298). In this way, the 'User account verification' ToC feature represents one such calculative practice that attempts to link up individuality with the abstract system of the website. Indeed, on websites such as Yelp it is not possible to progress into 'Elite' reviewer status (see previous sub-dimension) without using "your real name, a real (and clear!) profile photo, and an honest, unbiased opinion" (Yelp, 2015). In this way, user account verification can also be more implicit and links up to other website features, interpreted in this study as ToC.

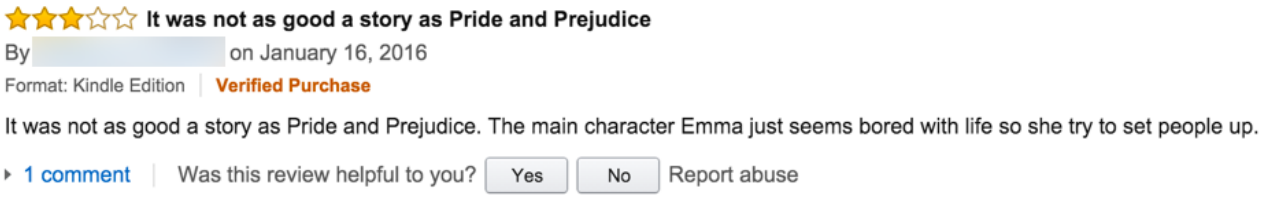


Figure 4.36: User account verification on Amazon

4.5.2 Sub-dimension 2: Networked Publics

While the previous sub-dimension of the conceptual framework focuses on processes of individualisation mediated through ToC, the focus of this sub-dimension is on how users are

configured (or indeed not configured) as social agents that are able to interact with other users. Throughout the analysis, a number of websites were observed to have a highly social or 'Web 2.0' logic, which appeared to be important in terms of understanding how choice is constructed. The four ToC features presented in this section mediate particular forms of sociality between users, configuring them within 'networked publics' that contribute to building and shaping the landscape of choice. As Ekbia and Nardi argue: "These developments signal that harnessing affective labor by promoting sociality and supporting challenging technical work might be a path to fostering automation at low cost" (2012, Section 3.2). In attempting to conceptually organise these features, I deploy danah boyd's concept of the 'networked public'. Drawing upon and developing the longstanding idea of 'publics', boyd argues that "*networked publics* are publics that are restructured by network technologies. As such, they are simultaneously (1) the space featured through networked technologies and (2) the imagined collective that emerges as a result of the intersection of people, technology, and practice" (2011, p. 1, emphasis original). boyd (2011, p. 7) argues that there are four key 'structural affordances' of networked publics: *persistence* (online expressions are automatically recorded and archived); *searchability* (content made out of bits can be duplicated); *scalability* (the potential visibility of content in networked publics is great); and *replicability* (content in networked publics can be accessed through search).

Users can share content via social media

A common feature of the majority of websites under analysis is the ability for users to quickly and easily share content via social media. For example, Figure 4.37 demonstrates how users are able to share reviews as posts on their own Facebook and Twitter profiles, including a personal note.

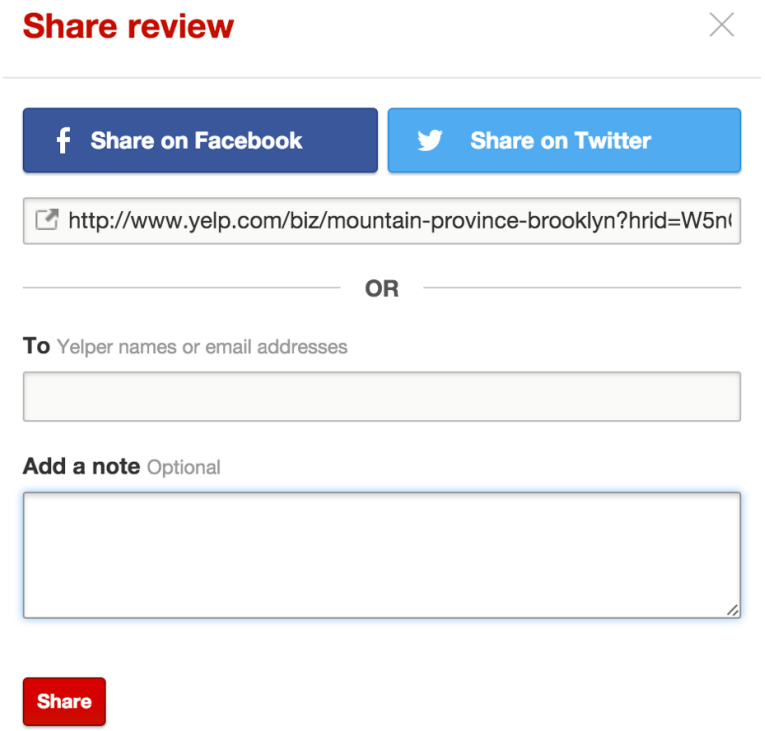


Figure 4.37: Sharing a restaurant review via social media on Yelp

Similarly, the ability to share content via social media also commonly appears as buttons above or below the post. As Figure 4.38 shows, there is a feedback loop from these buttons to the social media platforms, which reflects back the number of 'shares' that have accrued for a particular review on The Verge. This is an important aspect because it shows how different networked publics (e.g., Pinterest, Facebook) are mediated to converge and assemble within the web space, and have a role to play in shaping choice by providing a relatively *persistent* indicator of how much attention a particular piece of content has received (e.g., a particular review or a particular good or service). This impacts the *scalability* of the landscape of choice by opening it up to fluid, 'heterarchical' networked publics (Bruns, 2011) that render it visible - and to some extent mutable - beyond the apparent boundaries of the website itself. For example, a Facebook user might encounter and subsequently respond to a Yelp review without ever having visited the Yelp website. As Introna (2016) would have it:

> Most striking about this liquid and flowing sociomaterial assemblage is that it crisscrosses traditional boundaries such as the public and the private more or less effortlessly. It flows in all directions in many expected and unexpected ways, crossing institutional and social boundaries that have become increasingly malleable (2016, p. 19).

Figure 4.38: Sharing reviews via social media buttons on The Verge

User-to-user evaluation

An interesting aspect of several ToC websites is that they not only enable users to review, rate, and rank the options on offer, but also perform these kinds of evaluative practices on *other users*. For example, Figure 4.39 shows how other users have evaluated the user 'Fleur M'. From 4.39 we can surmise that Fleur M is approximately a '4 star' reviewer, is 'useful' and 'cool' but not very 'funny', and has received a range of compliments. In this way, Fleur M is configured within a networked public that evaluates her and produces a form of consensus about her qualities and capacities as a reviewer. This suggests that the networked publics presupposed and formed through ToC websites such as Yelp have an important role in self-regulating knowledge production within the landscape of choice. Indeed, Callon, Lascoumes and Barthe (2009) examine more broadly the role of publics in producing and transforming knowledge. Callon et al. suggest that uncertainty is transformed by publics into knowledge through collective ontological and epistemological processes that facilitate consensus. There is a parallel here with networked publics in the context of ToC. The 'User-to-user evaluation' sub-dimension seeks to conceptualise these kinds of processes, which have a role to play in shaping choice by enabling reviewers to evaluate each other, suggesting a kind of 'meta' logic to ToC.

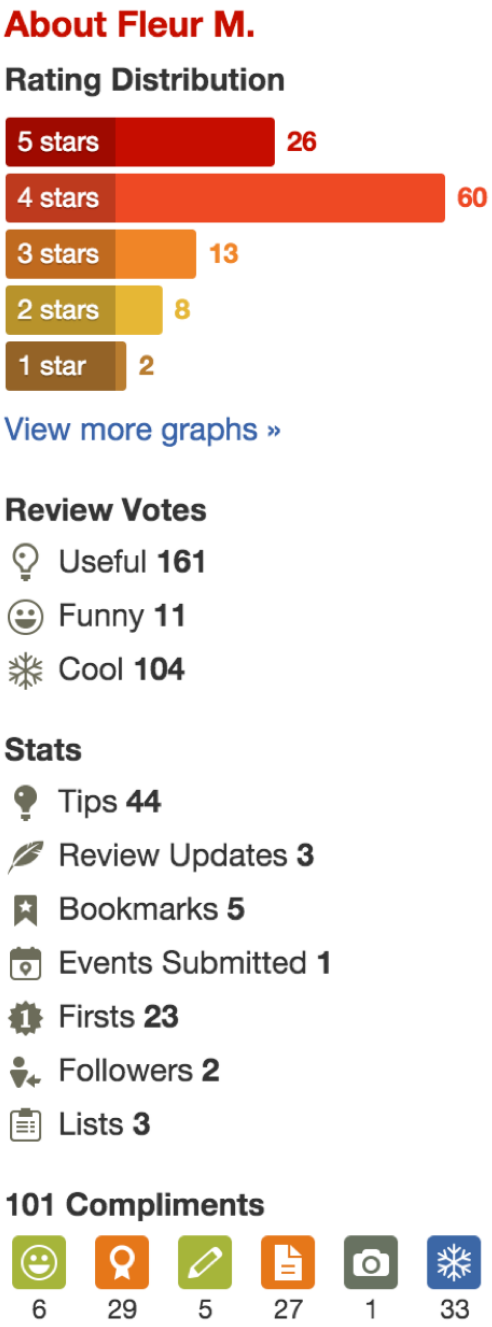


Figure 4.39: User-to-user evaluation on Yelp

Log in via social media profile

A relatively common feature of the websites in the study sample is the ability for users to create an account and log in using an existing social media account, such as Facebook, Twitter, or Google. As Figure 4.40 shows, users are able to "quickly sign in" using their Facebook, Yahoo, or Google accounts,

or alternatively through a less easier and more traditional process of signing up via email. At first glance this may appear inconsequential or mundane, but it has important implications for ToC. In this way, users are able to log in and interact with the landscape of choice presented by the site *as themselves*, that is, by importing their profile from another networked public and using it a new context. By enabling this to occur, the ToC website configures users as individuals within intersecting networked publics: when a user logs in with Facebook and reviews a good or service, they are, in a sense, performing this *as themselves*, and at the same time they may be interacting with users from other platforms (e.g., Twitter, Yahoo). This suggests a strong link between practices of individualisation and networked publics that traverse across site 'boundaries', as alluded to previously. For instance, users who log in with their own pre-existing profiles may be positioned as subjects in different ways and with a different force or magnitude, compared to users who do not use their own profiles, or do not log in at all.

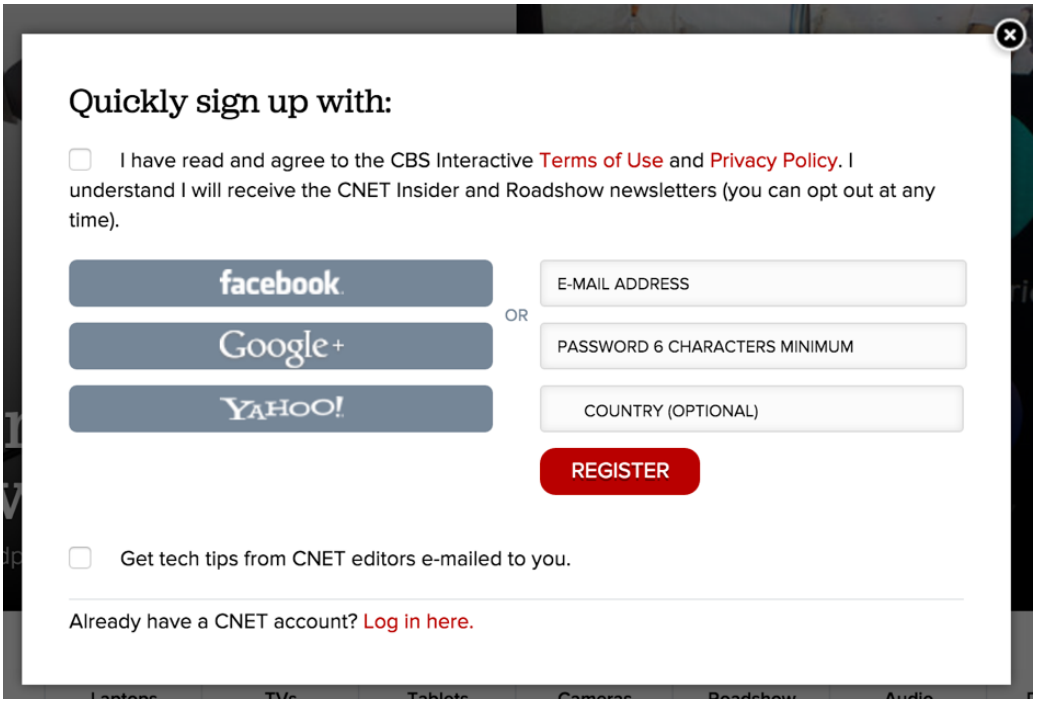


Figure 4.40: Logging in using an existing social media profile on CNet

User-to-user direct communication

The final feature in this sub-dimension concerns whether or not users are able to directly communicate with each other (e.g., via chat, Q&A features, or direct messaging). The absence or presence of this feature, considered here as a ToC, shapes the kind of social processes that are

afforded by the web space. It shapes the 'sociality' of the networked public that forms within and is constituted through the website, which in turn shapes the landscape of choice. For example, Figure 4.41 shows a user review of a car on edmunds.com. Importantly, because direct communication between users is facilitated, another user named 'purple43' has replied to the reviewer to provide "a caution for 2016 CR-V shoppers". User-to-user direct communication can also occur privately, for example through mail systems (e.g., makeupalley.com), or commonly through secure communication facilities for transactions (e.g., ebay.com). The important aspect is whether or not this has the potential to shape choice, and the analysis suggests that it does because of the strong social affordances that direct communication provides in spaces where users experience and enact choice.

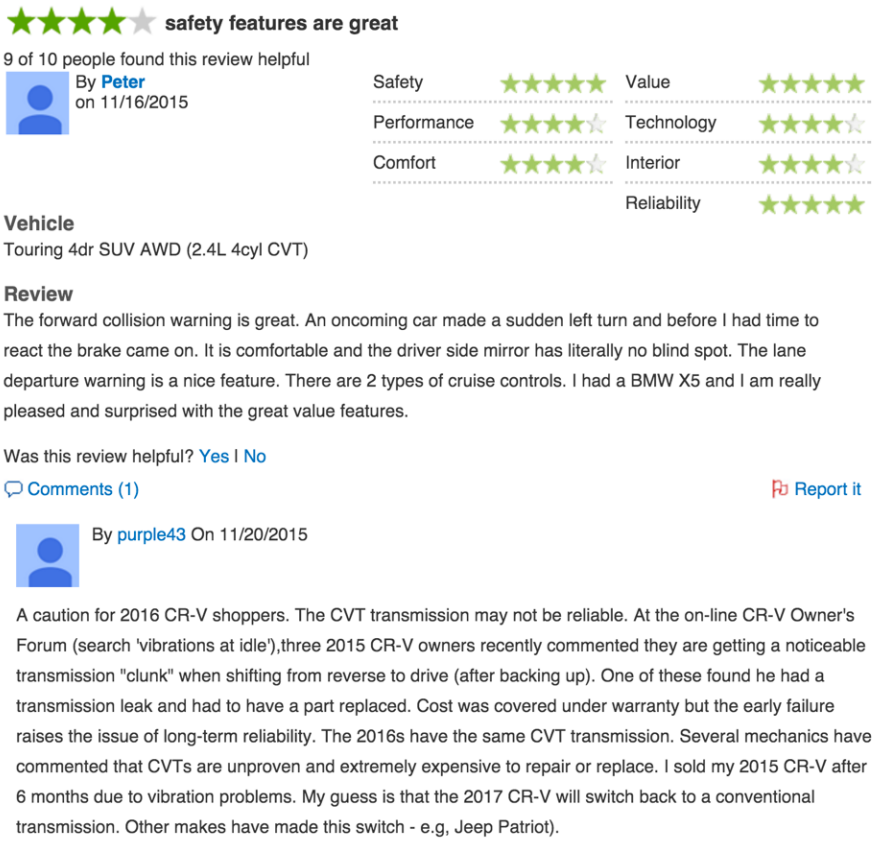


Figure 4.41: Users directly communicating with each other about the options on offer through ToC

4.6 Conclusion

This chapter has presented an updated ToC conceptual framework, which was refined and elaborated through empirical analysis of websites and drawing on the literature. This resulted in the addition of 12 'sub-dimensions' to the conceptual framework, along with a total of 56 features classified into the various sub-dimensions. The refined conceptual framework provides an analytic tool that can be used to examine ToC websites in order to understand how 'choice' is differentially featured through the co-presence or co-absence of design and architectural features. Indeed, in the next chapter I deploy the conceptual framework as a tool to analyse a large-scale sample of top-ranking ToC websites. In this way, whilst the present chapter provided a conceptual and theoretical ToC conceptual framework, in the next chapter I undertaken an empirical study of the extent and patterns of variety of ToC on the contemporary web.

Chapter 5

ToC on the web: A large-scale empirical enquiry

5.1 Introduction

This chapter reports on the analysis of 193 'ToC websites', drawn from a sampling frame of 500 top-ranking websites. The complete list of 193 sites in the sample is available in Appendix A. The empirical inquiry presented in this chapter examines some of the most well-known and 'successful' sites on the web, such as Amazon and eBay, which deploy ToC to construct online spaces in which millions of people experience and enact 'choice'. This chapter undertakes an empirical examination of the extent and patterns of variety of ToC on the web, across five different website categories drawn from the web rankings site alexa.com (as discussed in Chapter Three). The website categories are: 'Global', 'Australia', 'UK', 'Health', and 'Recreation'.

In the previous chapter, the conceptual framework developed in Chapter Two was elaborated upon using a sample of 30 top-ranking websites and 4 purposively sampled 'exemplar' websites (addressing RQ1). The revised conceptual framework comprises four 'over-arching' dimensions with 12 sub-dimensions, and 56 features. As discussed in Chapter Three, the conceptual framework is used in this chapter as an analytical tool to examine the characteristics of 193 ToC websites identified within a sample of 500 top-ranking websites. This form of content analysis involves

categorising or classifying each website by its characteristics according to the different dimensions, sub-dimensions, and features. A range of statistical methods is employed to answer the research questions, that aim to determine how widespread ToC are on the web and examine their patterns of distribution, as well as identify different 'types' or clusters of ToC.

This chapter is structured into two main sections. Firstly, the overall data corpus is examined and reported on as a whole. The reporting of findings is thereafter structured along the four 'dimensions' of the conceptual framework, namely: 'Having Choice'; 'Facilitating Choice'; 'Knowledge Production', and 'Configuring Users'. Secondly, the data corpus is re-examined in order to 'get at' and interpret underlying patterns or 'clusterings' in the functionality and features of the ToC websites in the study sample. As discussed in Chapter Three, this is achieved by performing multiple correspondence analysis (MCA) and hierarchical clustering (HC) on the empirical observations of websites surveyed. The findings indicate that, at the most general level, there are two broad or distinct 'clusters' of ToC, but with considerable variability within each. The clusters are named 'Delimited and Objective ToC' (Cluster 1) and 'Produsing ToC' (Cluster 2). The chapter concludes with a summary drawing together the overall findings, providing a platform in Chapter Six to discuss how the ToC clusters shape choice differently.

5.2 The distribution of ToC on the web

It is clear that ToC are a fundamental component of the contemporary web. Out of the 500 sites across five categories, 193 (or 38.6%) of sites were eligible to be included for further analysis and categorisation using the ToC conceptual framework. This finding suggests that, overall, ToC are a pervasive element of the contemporary web, at least among the most commonly visited websites. However, the distribution of ToC is not uniform. The prevalence of ToC differs according to each website category (see Table 5.1), such that some categories contain a high number of ToC websites (i.e., 75% of sites in 'Recreation'), whereas others contain a relatively small number (i.e., 22% of sites in 'Global').

That the 'Recreation' category contains a high proportion of ToC websites makes sense given that websites in this category relate to areas where 'consumer choice' is ubiquitous, such as travel,

Website category (alexa.com)	Percentage of ToC sites in category
Recreation	75%
UK	38%
Australia	29%
Health	29%
Global	22%

Table 5.1: Frequency of ToC websites across 5 website categories in the study sample

holidaying, food and cars). The next highest frequency of ToC websites was in the 'UK' category, with 38% of websites identified as ToC websites. The other geography-based category, 'Australia', contained somewhat less ToC websites (29%). These two findings suggest that for people living in the UK and Australia, ToC websites represent approximately a third of the most widely used websites. In other words, it is evident that ToC websites are important in these two geographic regions. Similarly, approximately a third of sites in the 'Health' category were observed as ToC websites. The 'Global' category revealed the lowest number of ToC websites (22%). It is worth reflecting that this category contains the highest-ranking sites across the entire web. Hence, it includes a large number of search engines (e.g., google.com), social media sites (e.g., youtube.com), social networking sites (e.g., facebook.com), and news sites (e.g., cnn.com, bbc.co.uk), among other sites that do not deploy ToC.

What Types of Websites Deploy ToC?

To further assess the distribution of ToC websites by website 'type', the Generic Top Level Domain, or GTLD, of sites was considered. The rationale of these data is to elicit 'broad-brush' insights into the 'demographic' of each website, providing an indication of whether a site is commercially oriented (.com, .net), government operated (.gov), or relating to the non-profit sector (.org).

Table 5.2 shows the distribution by GTLD for all 500 websites in the sampling frame and for the 193 websites that deploy ToC (bolded in brackets). It is clear that sites in the commercial sphere (.com and .net) represent the large majority of sites in both the overall sampling frame (500 sites) and the subset of ToC websites (193 sites). There were a number of government websites (.gov) in the 'Australia' (12 sites), 'UK' (7 sites), and 'Health' (14 sites) categories, yet very few of these were ToC websites (3 sites). Note, nhs.uk is a UK government operated ToC website, and as a result it was included as

a 'gov' site in this study even though it does not utilise the '.gov.uk' domain. Furthermore, nhs.uk appeared in both the 'UK' and the 'Health' categories. The 'Health' category contained a particularly high number of non-profit (.org) websites (19 sites), of which 7 were ToC websites. There appears to be a logic to this finding. Health is a domain of life in which individuals are faced with a considerable degree of choice, and the consequences of such health-related decisions can have significant impacts on wellbeing. Therefore it makes sense that individuals would utilise ToC websites in order to facilitate their decision-making about health related matters. Further, the 'mixed economy' of the health industry in many countries means non-profit websites are likely to be operating alongside commercial and government sites.

	Com	**Gov**	**Net**	**Org**	**Other**	**Total**
Recreation (75 ToC sites)	99%/**91%**	0%/**2%**	0%/**1%**	1%/**2%**	0%/**4%**	75/100
UK (38 ToC sites)	89.5%/**89%**	5.3%/**7%**	5.3%/**2%**	0	0%/**2%**	38/100
Australia (29 ToC sites)	100%/**83%**	0%/**12%**	0%/**4%**	0%/**1%**	0	29/100
Health (29 ToC sites)	72.4%/**62%**	3.4%/**14%**	0%/**1%**	24.1%/**19%**	0%/**4%**	29/100
Global (22 ToC sites)	91%/**90%**	0	4.5%/**3%**	4.5%/**4%**	0%/**3%**	22/100
Total number of ToC sites (GTLD)	178	3	3	9	0	193/500

Table 5.2: Percentage of websites by GTLD (500 sites in sample VS 193 ToC sites subset bolded in brackets)

The Market Sectors of ToC Websites

Understanding the kind of market sectors ToC websites tend to be located in tells us about the kinds of organisations and websites that use ToC. As discussed in Chapter Three, in order to categorise websites by sector this study draws on the standardised Industry Classification Benchmark (ICB). Table 5.3 shows that 14 out of 22 supersectors were observed in the 500 websites studied. For the subset of ToC websites (193 sites), 12 supersectors were observed (no ToC websites were observed in the 'Education' and 'Social Care' categories, respectively). Overall, ToC are not uniformly distributed within the web. They tend to appear in the 'Travel and Leisure' and 'Personal and Household Goods'

sectors. Indeed, Travel and Leisure accounted for the largest percentage of the 500 top-ranking sites in the overall sample (21%, 105/500 sites) and also the subset of ToC websites (39%, 79/193 sites), where it was over-represented by almost double (compared to the overall sample). In a similar way, ToC were over-represented in Personal and Household Goods ('PG'), with 22% (44/193) of ToC websites located in this supersector compared to around 10% for the overall sample (49/500 sites). Notably, the majority of PG sites in the overall study sample are observed to be ToC websites (90% or 44/49 sites). An interesting observation is that 100% of sites in the Food and Beverage (4/4) and Retail (4/4) sectors are ToC websites, although this must be interpreted with caution given the low count of data.

There were several instances where supersectors of ToC websites were under-represented in comparison to the overall sample. As shown in Table 5.3, Media and Technology were both highly prevalent in the overall sample of 500 sites, accounting for approximately 20% (101/500) and 13% (66/500) of sites respectively. However, these accounted for only 0.5% of sites (1/193) in the subset of ToC websites. There is a logic to this finding, given the large number of search engines, news, and social networking sites (SNS) that constitute the most popular sites on the web. These sites have fundamentally different logics that broadly relate to information retrieval (search engines), journalism and current affairs (news), and social interaction (SNS), rather than a logic of choice (interpreted in this study as ToC). This certainly does not preclude these types of websites from having a logic of choice, although this study did not sufficient evidence to warrant such an interpretation. Notably, only 1.6% of ToC websites were observed in the Government supersector (3/193), compared to 6.8% of sites (34/500) in the overall sample. As noted previously, this finding is compounded by the fact that the UK government ToC website nhs.uk appeared separately in both 'UK' and the 'Health' website categories on alexa.com, so it was counted twice in the sample. As Table 5.3 shows, about 10% of sites in the Government sector were ToC websites.

5.2.1 Dimension 1: 'Having Choice'

This section presents the findings relating to the 'Having Choice' dimension. The findings are guided by the second research sub-question (SQ2), namely: how widespread are ToC on the web and what are their patterns of distribution? Accordingly, this section is structured around the two sub-dimensions

Supersector	**% of 500 sites in sample**	**% of 193 ToC sites in subset**	**% of sample that are ToC sites**
TL (Travel and Leisure)	21.0% (105 sites)	39.4% (76 sites)	72.4%
ME (Media)	20.2% (101 sites)	0.5% (1 site)	1%
TE (Tech)	13.2% (66 sites)	0.5% (1 site)	1.5%
HE (Health Care)	10.2% (51 sites)	11.4% (20 sites)	39.2%
PG (Personal and Household Goods)	9.8% (49 sites)	22.3% (44 sites)	89.8%
GO (Government)	6.8% (34 sites)	1.6% (3 sites)	8.8%
BA (Banking)	4.6% (23 sites)	5.7% (12 sites)	52.2%
ED (Education)	3.6% (18 sites)	0 sites	0%
AP (Automobiles & Parts)	3.0% (15 sites)	6.2% (12 sites)	80%
RE (Real Estate)	1.4% (7 sites)	2.6% (5 sites)	71.4%
EM (Employment)	1.4% (7 sites)	2.1% (4 sites)	57.1%
TC (Telecommunications)	1.4% (7 sites)	2.6% (5 sites)	71.4%
FB (Food and Beverage)	1.0% (4 sites)	2.6% (4 sites)	100%
RT (Retail)	0.8% (4 sites)	2.1% (4 sites)	100%
FS (Financial Services)	0.6% (3 sites)	0.5% (1 site)	33.3%
IG (Industrial Goods & Services)	0.6% (3 sites)	1.6% (2 sites)	66.6%
SO (Social Care)	0.6% (3 sites)	0 sites	0%

Table 5.3: Distribution of websites by 'supersector' category: overall sample (500 sites) VS ToC websites subset (193 sites)

of this dimension, namely 'Types of options' and 'Scale of choice'. It provides foundational, broad-brushed insights about the kinds of 'choice' that ToC websites tend to have on offer, and the ways in which choice is scaled or delimited on the contemporary web.

Dimension 1.1 – 'Types of Options'

As discussed in Chapter Four, the 'types of options' that ToC have on offer is categorised using economic theory into six groups: 'private goods', 'club goods', 'common goods', 'public goods', 'private services', and 'public services'. A given ToC website may feature one or more of these types of options.

A key finding derived from Table 5.4 is that most ToC sites in the study sample provided 'private services' (67% of ToC sites) or 'private goods' (42% of ToC sites). Interestingly, 83% of sites in the 'Recreation' category provided 'private services', compared to approximately half to two-thirds of ToC sites within the other four categories. Three of the website categories exhibit a similar pattern, with

about half to two-thirds of ToC sites offering 'private goods'. ToC sites in the 'Recreation' category tend to offer mainly 'private services' (83%) rather than 'private goods' (19%), whereas ToC sites in the 'Health' category predominantly offer 'private goods' (72%).

'Types of options' on offer	**Global (22 ToC sites)**	**Australia (29 ToC sites)**	**UK (38 ToC sites)**	**Health (29 ToC sites)**	**Recreation (75 ToC sites)**	**All ToC sites (193**
Private services	55%	69%	58%	48%	83%	67% (130 sites)
Private goods	59%	48%	53%	72%	19%	42% (82 sites)
Club goods	18%	7%	8%	0	0	5% (9 sites)
Public goods	9%	0	0	0	4%	3% (5 sites)
Public services	0	0	5%	10%	0	3% (5 sites)
Common goods	5%	0	0	0	4%	2% (4 sites)

Table 5.4: Percentage of ToC websites that deployed each 'Type of option' (within each website category as well as total sample subset)

A large majority of ToC websites provide a single 'type of option' (84% or 162/193). For example, fiverr.com solely enables users to compare between 'private service' providers for hire (e.g., graphic designers, programmers), whereas aliexpress.com only offers comparisons between 'private goods' (personal and household goods). Further, 16% of ToC websites in the study sample offer more than one 'type of option' (mostly 'private goods' and 'private services'). Thus, 11% of ToC sites offered two types of options (21/193), and 5% of sites offered three types of options (9/193). Interestingly, yelp.com was the only site in the sample (1/193) to provide comparisons between 4 different types of options-'club goods' (e.g., gyms, cinemas), 'common goods' (e.g., natural tourist areas, fishing spots), 'public goods' (e.g., local parks), and 'private services' (e.g., hairdressers, restaurants).

Although only 5% of sites (9/193) in the overall sample provide 'club goods', it is clear from Table 5.4 that the distribution across the five website categories is somewhat skewed. Indeed, most ToC websites for 'Club goods' are in the 'Global' category. A skewed distribution is observed for 'public goods' and 'common goods', whereby only sites within the 'Global' and 'Recreation' categories offered these types of options, with no sites observed in the other three categories. It is notable that no ToC websites in the examined sample served to only offer comparisons for 'club goods' or 'common goods'. In this way, ToC websites that enabled users to compare between these types of goods did so in addition to offering comparisons between other types of options. For example, themeforest.net enables users to compare between and purchase 'themes' for personal or commercial use in web design. Users are able to compare between and purchase individual themes (private goods), but also subscriptions to gain

time-limited access to download themes (club goods). The findings suggest that ToC websites tend to offer 'club goods' in the form of subscriptions and/or memberships, but that these are offered only in conjunction with other types of options (e.g., private goods).

ToC sites that offered comparisons between 'public services' were only located within the 'UK' and 'Health' categories (see Table 5.4). Caution must be taken in interpreting these findings, given the low count of sites observed (5/193). The three other ToC sites that offered comparisons of 'public services' were tfl.gov.uk (public transport options in the UK), cancer.org (private and public health care services in the United States), and vitals.com (private and public health care services in the United States).

Dimension 1.2 – 'Scale of choice'

The 'scale of choice' sub-dimension captures the manner in which ToC websites are observed to artificially delimit or 'narrow down' the scale at which choice operates and is provided. This sub-dimension contains four 'scales' of choice: (1) global; (2) brand; (3) geography / jurisdiction, and (4) contractual.

'Scale of choice'	**Percent of ToC websites (n = 193)**
Global	59% (114 sites)
Brand	27% (53 sites)
Geography / jurisdiction	10% (19 sites)
Contractual	7% (14 sites)

Table 5.5: Percentage of ToC websites by 'Scale of choice' [Having Choice]

Table 5.5 shows that most ToC websites in the examined sample offer choice at a 'global' scale (59% or 114/193). For example, one might compare between 'Indian cooking' books on amazon.com, in the knowledge that the selection of books on offer interfaces with a global market of books in that genre. However, the converse of this finding is that a large portion of ToC websites (41% or 79/193) does in fact 'scale down' the options on offer.

Approximately one quarter of ToC sites in the study sample provide choice at the scale of 'brand' (27.5% or 53/193), such as: apple.com; microsoft.com; bankofamerica.com; and ikea.com. These findings suggest what is perhaps a self-evident conclusion: such websites deploy ToC in order to sell their own brand(s) of goods and/or services. Yet at the same time, by deploying ToC the user is presented with 'choice'-that is, a range of options to choose from, such as different models of iPads

on apple.com. This 'invocation' or operationalisation of the choice principle in a marketing context is discussed in Chapter Six.

There were 19 sites (or 10%) in the study sample that provide choice at the scale of 'geography/jurisdiction'. There is a logic regarding how ToC websites deploy this geographical 'scaling' of choice. For example, rightmove.co.uk (Real Estate sector) provides comparisons between properties for rent and sale in the UK, whilst realestate.com.au provides the same types of comparisons in Australia. Similarly, the two government-operated ToC websites provide comparisons between publicly funded health services in the UK (nhs.uk/service-search), and public transport options within the UK (tfl.gov.uk).

Lastly, 7% of ToC websites in the sample provide choice at a 'contractual' scale. Perhaps unsurprisingly, these were all commercial sites. Yet it is often difficult to establish whether a ToC website provides choice at the scale of 'contractual', because this can sometimes only be found by searching through Frequently Asked Questions (FAQs), or lengthy Terms of Service (TOS) or End User License Agreement (EULA) documents. What is important is that websites that deploy this ToC feature typically construct the perception of 'global' or all-inclusive choice, when the 'scale' of choice on offer is shaped by contractual arrangements.

The final part of analysis for the 'Having Choice' dimension sought to determine whether, and to what extent, meaningful correlations exist between the two sub-dimensions in Having Choice. Table 5.6 shows that ToC websites that offer comparisons between 'private goods' are strongly correlated with providing choice at a 'global' or 'contractual' scale. Similarly, ToC websites that provide choice at the scale of 'contractual' are strongly likely to offer 'private goods'. Of particular interest is the significant relationship between 'public services' and 'geography / jurisdiction'. This finding resonates with the findings in the previous section concerning the relationship between government-operated ToC websites and the particular 'types' and 'scale' of choice they offer, which contrasts somewhat to the rest of the data.

Types of options	Scale of choice	P-value (Fisher's Exact Test)
Private goods	Global	0.027 *
Private goods	Contractual	0.045 *
Public services	Geography / jurisdiction	0.007 **

Table 5.6: Statistically significant results for Fisher's Exact Test: 'Types of options' sub-dimension against 'Scale of choice' sub-dimension

5.2.2 Dimension 2: 'Facilitating Choice'

As Chapter Four presented, the 'Facilitating Choice' dimension of the conceptual framework provides a 'taxonomy' of all the different types of tools or functionalities that enable comparisons to be made on the web. There are 5 sub-dimensions within the 'Facilitating Choice' dimension, each of which relates to a key aspect of how choice is facilitated using ToC. This section examines these sub-dimensions to provide foundational insights about how top-ranking ToC websites 'facilitate choice' through the presence or absence of particular features that comprise the 'architecture' of the online space.

Dimension 2.1 - 'Characteristics of Commensurability'

During the refinement of the conceptual framework (see Chapter Four), it was found that there are primarily 7 different characteristics by which the options on offer can be rendered commensurable. These 7 different characteristics of commensurability are listed in Table 5.7. For example, users may compare between two different books based on a '5 star' rating, price, popularity, or recency (e.g., the release date of a product or the date when a service became available). These characteristics are not mutually exclusive, meaning that a given ToC website may deploy any combination of them.

Characteristics of commensurability) (Dimension 2.1)	Total sites (n=193)	Global (22 sites)	Australia (29 sites)	UK (38 sites)	Health (29 sites)	Recreation (75 sites)
Price***	149 (75%)	16 (73%)	20 (69%)	31 (82%)	9 (31%)	73 (97%)
Rating	127 (66%)	15 (68%)	15 (52%)	20 (53%)	18 (62%)	57 (76%)
Location***	106 (55%)	8 (36%)	12 (41%)	15 (39%)	9 (31%)	62 (83%)
Bestselling / popular	105 (54%)	15 (68%)	16 (55%)	22 (58%)	11 (38%)	41 (55%)
Recency***	75 (39%)	14 (64%)	16 (55%)	19 (50%)	10 (34%)	16 (21%)
Relevance***	57 (30%)	15 (68%)	14 (48%)	15 (39%)	3 (10%)	10 (13%)
Number of Reviews	7 (4%)	1 (5%)	1 (3%)	0	3 (10%)	2 (3%)

Table 5.7: Distribution of ToC websites by 'Characteristics of Commensurability' [Dimension 2.1]

As Table 5.7 shows, the most commonly occurring characteristic of commensurability was 'price', with 75% (149/193) of ToC websites enabling users to compare options based on this characteristic. This is not surprising, given the commercial orientation of the ToC websites in the study sample, and the significant proportion of ToC websites in the 'Recreation' website category (representing approximately 39% of sites in the sample). Almost all of the ToC websites in 'Recreation' provide the ability to compare options by 'price' (97%), which stands in contrast to the 'Health' category where only 31% of sites deploy 'price'.

The next most commonly occurring characteristic was 'rating'. Approximately two-thirds of ToC websites deploy 'ratings' as a characteristic of commensurability (65% or 125/193 sites). It should be noted that 'ratings' here refers to 'nominal ratings' (e.g., 'likert scale' 5-star ratings, 10 point ratings) rather than 'binary' (e.g., 'like' button) or 'unary' (e.g., upvote/downvote) ratings. This differentiation is important because it was observed in Chapter Four that 'unary' and 'binary' ratings are not deployed on ToC websites to enable direct comparisons between options (i.e., different options presented together on the same web page), but rather to enable indirect comparisons when assessing each option individually. Moreover, ratings were observed most often for ToC websites in the 'Recreation' website category (76%). Ratings featured on about two-thirds of sites in the 'Global' (68%) and 'Health' categories (62%), and about half of ToC sites in the 'Australia' (52%) and 'UK' (53%) categories.

It was found that about half of ToC websites in the study sample (55%) deployed 'location' as a characteristic of commensurability. This finding makes sense given that 'private services' are the type of option that the ToC websites in this study most often provide comparisons between (see Table 5.3 in the previous section), and that services, through their provision and consumption, are often geographical or spatial in nature. For example, when comparing between Chinese takeaway restaurants on yelp.com, users may wish to simply find the closest one (e.g., to their home).

Over half of ToC websites in the study (54%) utilised 'Bestselling / Popular' as a characteristic of commensurability. This finding resonates with the important role that algorithms have for ToC in sorting and classifying options on offer, that is, for facilitating choice on the web, which is discussed further in Chapter Six. Similarly, the 'relevance' characteristic of commensurability was observed on 13% of ToC websites. As discussed in Chapter Four, this characteristic enables users to sort the options on offer by how 'relevant' they are to the search query inputted by the user. Again, the

'relevance' characteristic is constructed algorithmically. Notably, only about 10% of sites within 'Health' category and 13% of sites in 'Recreation' deployed the 'relevance' characteristic of commensurability, in contrast to one-third of sites in the 'UK' category (39%), half in 'Australia' (48%), and two-thirds in 'Global' (68%). Indeed, as Table 5.7 shows, Fisher's Exact shows a highly significant relationship between the 'relevance' characteristic and website category.

Lastly, one-fifth of ToC websites in the study sample deployed the 'Recency' characteristic of commensurability. As discussed in Chapter Four, this ToC feature enables users to compare between options based on how recently they were released or added to the website. For example, a user may wish to find out the 'latest fashion' accessories by sorting options according to 'most recent'. Overall, this ToC feature occurred most commonly for sites in the 'Global' category (64%), including approximately half of sites in 'Australia' (55%) and 'UK' (50%), one-third in 'Health' (34%), and 21% of sites in the 'Recreation' category.

Dimension 2.2 - 'Presenting Options'

This sub-dimension of the conceptual framework inter-relates with the previous sub-dimension in respect to how users are configured within the online space in order for decision-making to be 'facilitated'. In this way, these sub-dimensions must be considered together in order to make sense of and interpret the findings in this chapter. For example, characteristics of commensurability such as 'price' do not, in themselves, enable direct comparisons between options on offer. Rather, such characteristics must be operationalised by the tools or presentational aspects of the site itself, such as 'sortable lists'. There are five features in this sub-dimension, listed in Table 5.8.

Presenting options) (Dimension 2.2)	**Total sites (n=193)**	**Global (22 sites)**	**Australia (29 sites)**	**UK (38 sites)**	**Health (29 sites)**	**Recreation (75 sites)**
Filter / Refine by Features	165 (85%)	19 (86%)	23 (79%)	36 (95%)	21 (72%)	66 (88%)
Sortable Lists	157 (81%)	16 (73%)	23 (79%)	29 (76%	22 (76%)	67 (89%)
Featured***	139 (72%)	17 (77%)	20 (69%)	22 (58%)	12 (48%)	68 (91%)
Deals / specials***	109 (56%)	10 (45%)	12 (41%)	24 (63%)	8 (28%)	55 (73%)
Side by side	70 (36%)	8 (36%)	10 (34%)	16 (42%)	4 (14%)	32 (43%)

Table 5.8: Distribution of ToC websites by 'Presenting Options' [Sub-dimension 2.2]

Table 5.8 shows the number and percentage of ToC websites in the study sample that deployed each feature in the 'Presenting options' sub-dimension. It was found that 'Filter / Refine by Features' occurred on the large majority of ToC websites in the study sample (85% or 165 / 193 sites), as was 'Sortable Lists' (81%), and 'Featured' (72%). Taken together, these three features represented the primary 'tools' provided to users in order to enable comparisons between the options on offer.

It was observed that over two-thirds of ToC websites (72% or 139/193 sites) in the study sample deployed the 'Featured' ToC, which refers to the designation of options on offer that are deemed to be particularly important or noteworthy. Often site administrators designate the 'featured' options; however options might also be 'featured' because they are recommended by 'experts' (e.g., webmd.com), are popular with users or viewed/purchased frequently (e.g., alibaba.com) or have received exceptional user-submitted ratings or reviews (e.g., tripadvisor.com). Table 5.8 shows that 'Featured' was deployed more often in the 'Recreation' category (91%) in comparison to other website categories.

In a similar way, 'Deals / specials' refers to designated options that are subject to special discounts or 'deals'. About half (56%) of ToC websites in the study sample deployed this ToC feature. In both cases, ToC websites that deployed 'Featured' and 'Deals / specials' were more likely to be located in the 'recreation' website category. This is perhaps a self-evident observation, yet it brings to attention several questions regarding the raison d'être of commercial ToC websites, discussed further in Chapter Six. In this way, Fisher's Exact confirms a statistically significant relationship exists between 'Deals / specials' and category of site (Table 5.8).

One-third of ToC websites (36% or 70 / 193 sites) in the study sample deployed the 'Side by side' ToC, which means that users are provided with the ability to select two or more options and do a 'side by side' comparison, in order to compare and contrast particular 'characteristics of commensurability' presented in a tabulated format. 'Side by side' differs from 'Sortable lists' because options presented 'Side by side' are not ordered but rather are self-selected by users. In contrast to the more commonly occurring ToC (namely 'sortable lists' and 'filter / refine by features'), this facility does not necessarily involve 'computing on' the characteristics or attributes of the options on offer. For example, this method of presenting options for comparison may in fact simply provide a neater way to tabulate text-based categorical or numerical information, which is manually curated by the website operators.

Sub-dimension 2.3 - 'Comparing individually'

This sub-dimension refers to tools that enable users to 'plunge deeper' into the options on offer by examining a particular option or type of option individually in greater detail (as outlined in Chapter Four). There are five features in this sub-dimension, as shown in Table 5.9. Overall, as Table 5.9 shows, the features in this sub-dimension did not occur as frequently as features in the 'Presenting options' sub-dimension (see previous section). In this way, approximately one quarter of ToC websites on average deployed the features in this sub-dimension (28.6%), compared to two-third (66%) in the 'Presenting options' sub-dimension. This suggests that comparing within options individually using the tools in this sub-dimension is not as important or popular as comparing between options based on 'characteristics of commensurability'.

Comparing individually) (Dimension 2.3)	**Total sites (n=193)**	**Global (22 sites)**	**Australia (29 sites)**	**UK (38 sites)**	**Health (29 sites)**	**Recreation (75 sites)**
Reviews	126 (65%)	12 (55%)	16 (55%)	18 (47%)	17 (59%)	54 (72%)
Similar items	69 (36%)	7 (32%)	14 (48%)	15 (39%)	7 (24%)	26 (35%)
Customer recommendation	33 (17%)	6 (27%)	4 (14%)	8 (21%)	1 (3%)	14 (19%)
Comments*	28 (15%)	8 (36%)	3 (10%)	2 (5%)	6 (21%)	9 (12%)
Customer Q&A**	20 (10%)	7 (32%)	4 (14%)	4 (11%)	3 (10%)	2 (3%)

Table 5.9: Distribution of ToC websites by 'Comparing individually' [Dimension 2.3]

Of the five features in 'Comparing individually', Table 5.9 shows that the most common was 'reviews', which was observed on 65% of ToC websites. Although 'reviews' and 'ratings' often occur in conjunction with one another (see Chapter Four) or are even used as synonymous terms (e.g., amazon.com), in this study these concepts are treated separately.

The 'comments' feature was observed on 15% of ToC websites in the study sample (28 / 193 sites). The role of 'comments' in this sub-dimension relates to the context of 'comparing individually' - users are provided with textual information that may have some elements of 'sortability' (e.g., sort by 'best' or 'most recent' comments), but otherwise tend not to enable users to render options directly commensurable.

Over a third of ToC websites in the study sample deployed 'similar items' (36% or 69 / 193 sites). As Chapter Four established, the 'similar items' ToC refers to the ability to view a list of items that are in

the same (or similar) category to the item the user is currently viewing. this ToC feature is deployed to display to the user other 'taxonomically' similar options that they may wish to consider (i.e., options that are classified into similar categories or topic areas). However, this is not to be conflated or confused with the 'personalised recommendations' ToC sub-dimension, which utilises recommender systems that take into account user preferences and/or attributes.

Although very few ToC websites deployed 'Customer Q&A' (10% or 20/193), it is observed that a statistically significant relation exists between this feature and website category. With due consideration of the small count of observations, this suggests that there is an interesting relationship between 'Customer Q&A' and the context in which choice is exercised. Indeed, as Table 5.9 shows, around a third of ToC sites in the 'Global' category deployed this feature (32%), considerably higher than the other four categories. This may reflect the nature of ToC sites in this website category (e.g., amazon.com, microsoft.com, ebay.com), which leverage a large user-base in order to enable 'Customer Q&A' to function effectively (i.e., if there are not enough users available to answer other users' questions, then this feature is defunct). Only 3% of sites in 'Recreation' deployed this feature, perhaps reflecting how the website operators are not directly responsible for, or connected to, providing the options on offer.

Sub-dimension 2.4 - 'Personalising functions'

The Personalising functions sub-dimension examines how choice is facilitated through ToC websites at an individualised level, as discussed in Chapter Four. This sub-dimension captures the ways in which users are able to compare between options and make decisions in a uniquely individualised way.

In Chapter Four it was established that a variety of ToC websites enable users to transact or 'complete' the choice after comparing the options on offer, for example, by purchasing a product or signing up to a service. As Table 5.10 reveals, 78% of ToC websites enabled users to 'transact choice'. Notably, only 45% of ToC websites in the 'health' category deployed this ToC feature, whereas approximately 80% to 90% of the other 4 'categories' of choice deployed this ToC feature.

In Chapter Four it was established that 'Personalised options' is conceptually analogous to the process of receiving a personal 'quote' for a product based on personal needs and requirements. In this way, the options on offer are tailored to the personal requirements of the user (i.e., the user specifies personal information and the options are suited to 'match'). It was found that about one fifth of ToC websites

Comparing individually) (Dimension 2.3)	**Total sites (n=193)**	**Global (22 sites)**	**Australia (29 sites)**	**UK (38 sites)**	**Health (29 sites)**	**Recreation (75 sites)**
Transacting choice***	151 (78%)	19 (86%)	23 (79%)	30 (79%)	13 (45%)	66 (88%)
Personalised options**	41 (21%)	5 (23%)	4 (14%)	11 (29%)	13 (45%)	8 (11%)
Personalised recommendations**	37 (19%)	11 (50%)	4 (14%)	9 (24%)	4 (14%)	9 (12%)
Live chat service*	26 (13%)	7 (32%)	6 (21%)	5 (13%)	4 (14%)	4 (5%)

Table 5.10: Distribution of ToC websites by 'Personalising functions' [Dimension 2.4]

(41 /193) deployed this ToC feature. Notably, nearly half of all ToC websites in the 'health' category were observed to provide 'personalised options' (45% or 13/29 sites), a considerably higher number compared to ToC websites in the other four website categories.

As discussed in Chapter Four, 'Personalised recommendations' is positioned within the nascent 'recommender systems' literature, and interpreted in this study as a ToC deployed in web spaces. In a general sense, recommender systems (RSs) are software tools or algorithms that use "the opinions of a community of users to help individuals more effective identify content of interest from a potentially overwhelming set of choices" (Herlocker, Konstan, Terveen & Riedl, 2004, p. 5). This ToC feature is perhaps personified by the Amazon website: "Customers Who Bought This Item Also Bought...". However, as this section reveals, this ToC feature is a fairly common occurrence on the contemporary web. In this way, it is observed that nearly one-fifth of the top-ranking ToC websites overall deployed this ToC feature (19% or 37/193 sites). Notably, it is deployed on about half of the ToC websites in the 'global' category (50% or 11/22), a considerably higher percentage compared to other categories, and obtained a significant relationship with website category (see Table 5.10). Thus, at least for the top-ranking sites in this study, it is clear that 'personalised recommendations' are an important and popular tool for users (and therefore websites operators).

Lastly, although 'Live Chat Service' is infrequently deployed on ToC websites (13% or 26/193), it is noted that this ToC is unevenly distributed across the different website categories in the study. About one third of ToC sites in the 'Global' category deployed 'Live Chat Service', in contrast to only 5% in the 'Recreation' category.

5.2.3 Dimension 3: 'Knowledge Production'

When confronted with many different options to choose between, how do we know which one is better? Where does this knowledge come from and what forms does it take? As discussed in Chapter Four, the 'Knowledge Production' dimension of the conceptual framework addresses the questions via three sub-dimensions that relate to the *types of knowledge* operating within ToC, the *sources* where this knowledge comes from, and whether users are able to 'police' or curate knowledge circulating within the website.

Dimension 3.1 – 'Types of knowledge'

As established in Chapter Four, 'Types of knowledge' provides a way to understand how the options on offer in a given ToC website are represented digitally as 'knowable' entities. For example, knowledge about books and other products on amazon.com is constructed predominantly in the form of 'nominal ratings' (in this case '5 star ratings') and 'reviews'. It is through these socio-technical knowledge artefacts (interpreted in this study as ToC) that users come to know whether one option (e.g., a book) is a better choice for them compared to other options. The findings presented in this section address which types of knowledge are the most common and the patterns of their distribution.

Type of knowledge [Dimension 3.1]	**% of ToC sites (193 total)**
Textual description	189 (98%)
Images	170 (88%)
Ratings (nominal)	127 (66%)
Reviews	126 (65%)
Statistics (vis-à-vis population)	91 (47%)
Ratings (different characteristics or features)	79 (41%)
Videos	72 (37%)
Ratings (unary)	46 (24%)
Comments	28 (14.5%)
Ratings (binary)	7 (4%)

Table 5.11: Distribution of ToC websites by 'Types of knowledge' [Dimension 3.1]

Table 5.11 provides several insights. First, 'textual descriptions' are an almost universal type of knowledge on ToC websites, occurring on 98% of sites in the study sample (189/193). Similarly, 'images' are used to construct knowledge on the large majority of ToC websites (88% or 170/193). These findings are not surprising, given that the use of text and images to display information on

webpages is a foundational component of the architecture of the web (HTML at its core facilitates the structuring of text-based multimedia documents). Thus, in coarse-grained terms, we observe in Table 5.11 that the large majority of ToC websites enable users to read about and visually inspect the options they are comparing on a given ToC website in order to gain knowledge about such options. Again, this finding might appear uninteresting at first glance. However, as the next section addresses, *who* is authorised within a web space to write/publish textual descriptions and upload/publish images is more complex and analytically important, obtaining potentially far-ranging consequences (discussed in Chapter Six).

Textual descriptions, visual images and videos are always deployed in conjunction with other ToC. There were no sites in the study sample that deployed these features in isolation. As Table 5.11 shows, two-thirds of ToC websites in the study sample deployed 'nominal ratings' (66% or 127/193). As discussed in Chapter Four, examples of nominal ratings include '5 star' ratings and '10 point ratings'. Notably, *one third of ToC websites do not deploy nominal ratings* (that is, they construct knowledge about the options on offer in other ways). Related to this finding is the observation that approximately one third of ToC websites in the study sample deployed 'reviews' (65% or 126/193 sites). There is a logic to this finding, given that in the previous section it was established that there was a highly significant relationship between 'nominal ratings' and 'reviews' on ToC websites. Moreover, the notable absence of ratings and reviews from certain types of ToC websites is discussed further in Section 5.3, with respect to the patterns and clusters of ToC.

It was observed that 41% (79/193) of ToC websites in the study sample deployed 'ratings (different characteristics or features)'. As discussed in Chapter Four, this feature refers to the ability for users to compare between separate ratings for different characteristics of the options on offer, as opposed to one 'overall' rating. For example, target.com enables users to provide three different product ratings according to 'value', 'ease of use' and 'quality', and gsmarena.com enables users to rate mobile phones by 'design', 'features' and 'performance'. Clearly, this is a useful type of knowledge to deploy on ToC websites, given the significant number of sites in the sample study that were observed.

Approximately half of the ToC websites in the study sample deployed 'statistics (vis-à-vis population)' (47% of 91/193 sites). As discussed in Chapter Four, this concept refers to the ability to compare options on offer (on a ToC website) using statistical attributes of options, in the context of a 'population' of options that can be rendered commensurable by a common statistical construct. For

example, rightmove.co.uk enables users to compare houses for sale by assessing statistical 'market info' such as the median housing price in a particular geographical region (e.g., Oxford). This statistic is rendered meaningful only in relation to the 'population' median for the Oxford region, and in this way is conceptualised as 'statistics (vis-à-vis population)'. Overall, the finding that approximately half of ToC websites in the study sample utilised this type of knowledge raises several lines of inquiry regarding the important role of statistics in ToC websites in respect to modes of governing choice.

Attention now turns to 'unary ratings' and 'binary ratings'. In Chapter Four, it was established that unary ratings are commonly recognized as 'like it' buttons (Sparling & Sen, 2011). These ratings are 'unary' in the sense that there is no 'dislike' button-users either click 'like' or perform no action at all. Interpreted as a ToC feature, unary ratings enable users to gauge the quality or popularity of an option by the number of 'likes' it has compared with other options. It was found that approximately one quarter of ToC websites in the study sample deployed unary ratings as a type of knowledge (24% or 46/193 sites). Interestingly, it was also observed that the majority of ToC websites that deployed unary ratings did so through integration with social media platforms (e.g., Facebook 'like' buttons).

Dimension 3.2 – 'Sources of knowledge'

In Chapter Four, three 'sources of knowledge' were identified, providing a framework to examine the production of knowledge through ToC. In this way, 'Types of knowledge' are interpreted as coming from one or more of three 'sources': (1) 'Users' – knowledge that is produced by 'everyday' users of websites; (2) 'Website Operators / Experts' – knowledge that is produced by website operators or experts appointed by the website operators; and (3) 'Institutional authorities' – knowledge that is produced by institutions or organisations that conduct and provide independent research relating to the options on offer (in a given ToC website). 'Sources of knowledge' is important because it enables a problematisation of not only what 'Types of knowledge' are deployed on a ToC website, but also who is authorised to contribute to, or curate, these types of knowledge. As a result, 'Types of knowledge' and 'Sources of knowledge' are co-extensive features in the ToC conceptual framework-there cannot be one without the other (see Table 5.12). For example, a particular option on offer within a ToC website could have a 'nominal rating' of 5 stars (out of five), but it is equally important to know whether this rating represents the views of other users, the views of the website operators or expert's

opinion, or an institutional authority. 'Sources of knowledge' provides a means by which to answer these epistemological questions.

	Users only	**Website only**	**Auth Only**	**Users / Website**	**Users / Auth**	**Website / Auth**	**Users / Website / Auth**
Textual description	38 (20%)	99 (52%)	0	41 (22%)	0	11 (6%)	0
Images	27 (16%)	88 (52%)	0	55 (32%)	0	0	0
Ratings (nominal)	98 (77%)	7 (6%)	2 (2%)	17 (13%)	3 (2%)	0	0
Reviews	99 (79%)	8 (6%)	1 (1%)	16 (13%)	2 (2%)	0	0
Statistics (vis-à-vis population)	30 (33%)	35 (38%)	12 (13%)	12 (13%)	1 (1%)	1 (1%)	0
Ratings (different chacteristics or features)	70 (89%)	3 (4%)	1 (1%)	4 (5%)	1 (1%)	0	0
Videos	7 (10%)	52 (72%)	0	13 (18%)	0	0	0
Ratings (unary)	46 (100%)	0	0	0	0	0	0
Comments	28 (100%)	0	0	0	0	0	0
Ratings (binary)	7 (100%)	0	0	0	0	0	0

Table 5.12: Distribution of ToC websites: 'Types of knowledge' by 'Sources of knowledge' [Dimensions 3.1 and 3.2]

Table 5.12 reveals the number of ToC websites that deployed each 'source of knowledge' in respect to the different 'types of knowledge' on ToC websites. Note that the sources of knowledge are abbreviated in Table 5.12 as 'User', 'Website', and 'Auth'. Table 5.12 shows all the possible combinations that could (theoretically) be observed within a given ToC website, along with the empirical observations drawn from the 193 ToC websites in the study sample. There were 905 instances (i.e., observations) whereby a ToC website deployed one of the 'types of knowledge' (and therefore invoked a 'source of knowledge'). Overall, it was found that the majority of knowledge about the options on offer is predominantly sourced from 'users' and 'website operators / experts', with a comparatively small percentage of ToC websites deploying knowledge from 'institutional authorities'. In this way, about half of the observations were sourced solely from 'users only' (46% or 420/905 observations), about one-third of observations were sourced solely from 'websites operators / experts only' (32% or 292/905

observations), and only 1.4% of observations were sourced solely from 'institutional authorities only' (16/905 observations).

It is further observed that knowledge about the options on offer often derives from 'hybrid' sources, each comprising some combination of the three primary sources of knowledge. The findings here reflect a similar pattern. In this way, 17.5% of observations were sourced from a combination of 'users' and 'websites operators / experts' (158/905 observations). However, only 0.8% of observations were sourced from a combination of 'institutional authorities' and 'users' (0.8% or 7/905 observations), and only 1.3% of observations were sourced from a combination of 'institutional authorities' and 'website operators / experts' (1.3% or 12/905 observations). Interestingly, there were no observations whereby all three sources of knowledge were deployed simultaneously (i.e., 'Users / Website / Auth') in respect to any type of knowledge.

It is also evident that certain *types* of knowledge are dominated by particular *sources* of knowledge. At the most extreme, there were 3 types of knowledge for which the only source of knowledge was 'users' (i.e., 100% of observations), namely: 'unary ratings', 'comments', and 'binary ratings'. This finding is to some extent self-evident. As observed in the previous section, the majority of 'unary ratings' deployed on ToC websites in the study sample were achieved through social media interfaces (e.g., Facebook 'likes'). Furthermore, it was also observed that 'users' were the predominant source of knowledge in respect to 'ratings for different characteristics' (89% or 70/79 observations), 'reviews' (79% or 99/126 observations), and 'nominal ratings' (77% or 98/127 observations).

There were 3 types of knowledge (deployed on the ToC websites in the study sample) that were predominantly produced (or curated) by 'website operators / experts'. In this way, it was found that 'website operators / experts' constituted the source of knowledge for about half of all 'textual descriptions' (52% or 99/189 observations), about half of all 'images' (52% or 88/170 observations), and over two-thirds of the observations for 'videos' (72% or 52/72 observations). For example, microsoft.com has complete curatorial control over the 'textual descriptions', 'videos', and 'images' of products on offer through its website (i.e., the source of knowledge for these types of knowledge is the website operator, Microsoft Corporation). On the other hand, whilst makeupalley.com retains curatorial control over the textual descriptions of options on offer, it is observed to share control over images with users, who are enabled to post their own photos relating to the products on offer alongside the photos authored by the website.

The 'hybrid' sources of knowledge are notable, particularly the proliferation of the 'Website / User' as a source of knowledge. As Table 5.12 shows, it is evident that curatorial control is partially ceded to users in around one-fifth to one-third of ToC websites for 'textual descriptions' (22%), 'images' (32%), and 'videos' (18%). At the same time, it interesting that, for these three types of knowledge, the power to shape knowledge about options on offer is not ceded to (or shared with) users to the same extent as other types of knowledge. For example, as Table 5.12 shows, approximately 80% of 'nominal ratings' and 'reviews' on ToC websites are sourced from 'users' (rather than 'website operators / experts'). At a further extreme, as Table 5.12 shows, there are three 'Types of knowledge' for which 100% of the 'Sources of knowledge' is 'users' (namely 'unary ratings', 'binary ratings', and 'comments'). Thus, it is observed that there is considerable variability regarding who is able to produce knowledge through ToC websites, and in what capacities they are configured to do so (i.e., the 'types of knowledge' deployed).

Dimension 3.3 – 'Policing of content'

Overall, it was observed that about half of the ToC websites in the study sample deployed the 'policing of content' feature (47% or 90/193 sites). This suggests that website operators often cede curatorial control of content over to the general population in order to govern large volumes of information that converge and flow within the web space. Fisher's Test reveals a significant relationship between 'policing of content' and website category. Indeed, this feature is over-represented in the 'global' category (82% of sites) and underrepresented in the 'recreation' category (29% of sites).

5.2.4 Dimension 4: 'Configuring Users'

As discussed in Chapter Two, choice is fundamental to the formation of self-hood in contemporary Western societies. Individuals cultivate a sense of self through the choices they make in consumer societies where nearly every aspect of life is self-referenced (Rose, 1999, p. 231). ToC provide a contemporary tool for navigating and enacting choice. However, as Chapter Four revealed, users are configured by ToC in different ways that are categorised into two sub-dimensions, namely 'individualisation' and 'networked publics'.

Dimension 4.1 – 'Individualisation'

As Table 5.13 shows, there are 4 features in this sub-dimension. The most commonly occurring is 'User accounts', which is observed on the large majority ToC websites in the study sample (93% or 180/193 sites). This suggests that there is an important rationale as to why the large majority of ToC website operators enable users to 'log in' and have their own user accounts within the web space. This finding also establishes a key implication for the analysis of subjectivity vis-à-vis ToC websites. In this way, the majority of the time, users of ToC websites are able to participate in the web space as themselves (i.e., as individual users with a personal profile or account, rather than as anonymous agents). At the same time, each ToC website deploys 'User accounts' in different ways according to their raison d'être, and this feature only provides rudimentary - though nonetheless important - insights into processes of individualisation.

Individualisation (Dimension 4.1)	**Total sites (n=193)**	**Global (22 sites)**	**Australia (29 sites)**	**UK (38 sites)**	**Health (29 sites)**	**Recreation (75 sites)**
User accounts	180 (93 %)	22 (100%)	27 (93%)	36 (95%)	27 (93%)	68 (91%)
Profile details publicly visible*	76 (39%)	14 (59%)	13 (45%)	10 (26%)	15 (52%)	24 (32%)
Badges / levels / achievements	65 (34%)	11 (50%)	10 (34%)	9 (24%)	7 (24%)	28 (37%)
Verified accounts / purchases**	48 (25%)	10 (45%)	5 (17%)	5 (13%)	2 (7%)	26 (35%)

Table 5.13: Distribution of ToC websites by 'Individualisation' [Configuring Users dimension]

The next question is the extent to which user accounts or profiles enable users to 'make up' and conduct their activities as individuals within ToC websites. A key aspect of this depends on whether user profile details are publicly visible, such as whether an individuals' profile page exposes personalising details such as gender, age, interests, and status. It was observed that 39% of the ToC websites in the study sample enable the profile details of users to be publicly visible (76/193 sites). Moreover, as Table 5.13 shows, Fisher's Exact Test reveals a significant relation between this feature and website category. In particular there is again an interesting juxtaposition between 'Global' and 'Recreation' ToC websites. In this respect, about two-thirds of 'Global' ToC websites enable profile details to be publicly visible, compared to one-third of sites in the 'Recreation' category. Thus, it appears that websites in these two categories tend to configure users in different capacities.

A further aspect of individualisation on ToC websites relates to how users are able to categorise themselves as a result of activity conducted on the website, for example by earning 'badges', 'levels', or 'achievements'. As discussed in Chapter Four, this is an important process of individualisation because it provides users with the ability to categorise themselves and others (and their activities) in particular ways according to the discourses and rationalities of the ToC website, for example, as a 'Top 500 reviewer' (amazon.com), as 'Funny' or 'Cool' (yelp.com), or according to 'Tech Level' (newegg.com). It was observed that approximately one third of ToC websites in the study sample deployed 'Badges / Levels / Achievements' (34% or 64/193 sites). This finding lends support to the notion that particular types of ToC websites shape and govern choice by individualising and subjectifying users in particular ways, discussed further in Chapter Six.

In a similar way, about a quarter of ToC websites in the study sample deployed 'User account verification' (25% or 48/193). As discussed in Chapter Four, this relates to the verification of "real" aspects of users and their activities. For example, amazon.com displays a 'Real Name' tag next to users who have verified their true identity, and a 'Verified Purchase' tag next to product reviews, indicating that the user has actually purchased the product they are reviewing. Other ToC websites, such as codecanyon.net deploy a 'blanket' verification system whereby users cannot even review a product unless they have actually purchased the product (effectively filtering out all unverified or potentially 'invalid' knowledge about the options on offer, as derived from reviews). It is therefore interesting that one quarter of ToC websites in the study sample deployed 'Verified Accounts / Purchases', given the role this feature has in producing "truth" within the ToC website at the intersection of subjectivity (e.g., linking the validity of knowledge to the subject). This idea is discussed further in Chapter Six. Moreover, as Table 5.13 shows, the percentage of ToC sites that deployed this feature was particularly high for the 'Global' (45%) and 'Recreation' categories (35%). Notably, the large majority of ToC sites in the 'Health' category did not deploy 'User account verification'. There appears a logic to these findings, which reflects the nature of knowledge in different website categories, and the modes or processes of individualisation that intersect these categories. This suggests several lines of inquiry for further discussion, particularly in relation to how 'true' or valid knowledge is established and maintained in ToC websites, and how knowledge production links up to practices of individualisation. I address these in Chapter Six.

Dimension 4.2 – 'Networked Publics'

'Networked Publics' is concerned with whether, and how, users of ToC websites are configured to participate, and hence experience themselves and others, as members of 'networked publics'. This term draws on danah boyd's work, which conceives the "imagined collective[s] that emerges as a result of people, technology, and practice" (boyd, 2011, p. 39). This sub-dimension has a coextensive relationship with processes of individualisation (Dimension 4.1), as discussed in Chapter Four. As Table 5.14 shows, there are four features within 'Networked Publics', each of which will be reported on in this section.

Networked publics (Dimension 4.2)	**Total sites (n=193)**	**Global (22 sites)**	**Australia (29 sites)**	**UK (38 sites)**	**Health (29 sites)**	**Recreation (75 sites)**
Users can share content via social media*	121 (63%)	17 (77%)	22 (76%)	22 (58%)	22 (76%)	38 (51%)
User-to-user evaluation	71 (37%)	14 (64%)	11 (38%)	16 (42%)	10 (34%)	20 (27%)
Log in via social media profile**	67 (35%)	12 (55%)	13 (45%)	5 (13%)	6 (21%)	31 (41%)
User-to-user direct communication***	64 (33%)	13 (59%)	11 (38%)	13 (34%)	14 (48%)	13 (17%)

Table 5.14: Distribution of ToC websites by 'Networked publics' [Dimension 4.2]

Table 5.14 demonstrates that approximately two-thirds of ToC websites in the study sample deployed the feature 'users can share content via social media' (63% or 121/193 sites). As Chapter Four established, this feature relates only to sharing aspects related to 'choice'. For example, posting a particular good or service (on offer in the ToC web space) on Facebook, or 'tweeting' an interesting product review-but not simply clicking 'like' on the company that operates the website. The finding presented here reveals that ToC websites are, on the whole, extensively interconnected with social media platforms and the broader social web. In this way, networked publics within ToC web spaces link up with, and extend outwards in a heterarchical fashion to other networked publics such as Twitter, Facebook, and Pinterest. Thus, users are positioned within and exposed to networked publics that impact upon 'choice' at a distance. For example, a user of a given ToC website may observe that a particular product has 1,000 Facebook 'likes', and choose this product instead of one

that has 10 'likes'. They may also then opt to click 'like' on this product, and in this way not only use, but also 'produse' ToC, as I discuss further in Chapter Six.

In a similar way, it also evident that broader networked publics across the social web extend *inwards* to ToC websites. As Table 5.14 shows, about a third of ToC websites (35% or 67/193) enable users to 'log in via social media profile' (i.e., from another service such as Facebook or Google). Interestingly, this was especially high for ToC websites in the 'Global' (55% of sites), 'Australia' (45% of sites), and 'Recreation' (41% of sites) categories, and comparatively low for 'UK' (13% of sites) and 'Health' (21% of sites). The implication of these findings is that, on average, one third of ToC websites enable users to experience the website as themselves, that is, in the capacity of their online profiles brought across from major social media platforms and SNS.

As discussed in Chapter Four, another key aspect of configuring users concerns the tools that ToC website users have for interacting with each other within the space. Such tools have a structuring effect on the types of 'networked publics' and social processes that are rendered possible within the space, and therefore have important consequences for the types of subjects and 'networked publics' that are presupposed-and potentially produced-through ToC websites.

Firstly, we wish to examine the extent to which 'User-to-user direct communication' is enabled through ToC websites, for example, commenting on user-submitted reviews or sending direct messages to other users. As Table 5.14 shows, approximately one third of ToC websites in the study sample enabled users to communicate directly with each other (33% or 64/193 sites). This finding reveals that websites that deploy ToC also often enable users to form social relations with one another through means of direct communication (e.g., comments, messages). As Table 5.14 also reveals, Fisher's Exact shows a significant relationship between 'User-to-user direct communication' and the 'global' website category. Indeed, 59% of websites in the 'Global' category enable this feature, more than triple that of sites in the 'Recreation' category (17%).

Secondly, one-third of ToC websites in the study sample enabled 'User-to-user evaluation' (37% or 71/193 sites). As discussed in Chapter Four, this feature relates to the ability for users to adopt a curatorial role over other users within the web space, for example by 'voting up' helpful reviews, submitting poor ratings for content that is unhelpful, or assigning publicly visible labels / categories to users who demonstrate particular attributes (e.g., 'Funny' or 'Cool'). As Table 5.14 confirms, there is

a significant relationship between this feature and website category. ToC sites in the 'Global' category demonstrate the highest percentage (64%).

5.3 The patterns of ToC on the web

The data were analysed in order to identify and interpret any underlying patterns or 'clusterings' in the features of ToC websites. As described in Chapter Three, this process was cumulative and used a combination of MCA and HC. MCA was firstly used to extract underlying patterns from the data to provide more succinct interpretations of how ToC features are deployed (by reducing the dimensionality of the data). Second, HC was performed on the principal axes produced from MCA in order to examine and interpret whether, and how, there are 'clusters' of ToC websites that exhibit shared patterns of how ToC are deployed.

5.3.1 Patterns within Dimension 2: 'Facilitating Choice'

MCA was performed on the 25 dichotomous variables within the 'Facilitating Choice' dimension on the 183 unique ToC websites in the study sample [1]. The results of MCA are summarised in this section and the complete analysis and results are available in Appendix B. MCA generated 25 principal axes, of which the first four were retained (see Table 5.15). As described in Chapter Three, Cattell's scree test was used to select how many axes to retain for further analysis.

The first axis was interpreted as 'Information functionality'. This axis explained 19.1% of variance. It describes the economy of information that users are able to interact with using the functionality provided (i.e., low-information functionality versus high-information functionality). Five variables were determined to best characterise Axis 1: 'Rating', 'Sortable lists', 'Reviews', 'Filter by features', and 'Customer recommendation'. The presence of these ToC features requires a large economy of information circulating *internally* within the web space for them to function effectively. For example, ratings and reviews generally require user-generated data to make them functional, and

[1] The complete dataset contains 193 sites, however there are instances where the same site appears in multiple categories (e.g., tripadvisor.com in 'Global' and tripadvisor.co.uk in the 'UK' category), so these 10 'duplicates' were removed in this analysis to structure the data appropriately for MCA.

functionality such as 'customer recommendation' gain utility as more users express their opinion by clicking 'recommend' or 'not recommend'. In this way, variable categories that are negatively correlated on Axis 1 are characterised as 'high-information functionality', and the sites associated with these categories tend to be in the 'travel and leisure' (TL) and 'personal goods' (PG) sectors. On the other hand, the negative side of Axis 1 describes the *absence* of these ToC features. Websites that are associated with the negative side of Axis 1 are described as 'low-information functionality'. These sites often appear to attempt to construct a comparatively small amount of 'objective' statistical information about the options on offer, rather than a user-generated economy of information generated internally within the website. The lack of functionality reflects this logic. For example, banking websites are highly negatively correlated on Axis 1. These websites tend to provide a limited number of options on offer (e.g., three credit cards to choose from) and often appeal to statistical information presented in tabular formation (e.g., using the 'side by side' ToC feature; see Section 4.3.2).

The second axis accounted for 12.9% of variance and was interpreted as 'geographic insensitivity / temporal sensitivity', revealing a juxtaposition of how choice is facilitated in terms of geography and time. Five variables were determined to best describe Axis 2: 'Search by location', 'Location', 'Comments', 'Customer Q&A', and 'Recency'. As Table 5.15 shows, the variable categories that best describe the positive side of Axis 2 are 'search by location' (-) and 'Location' (-), meaning that ToC websites positioned positively on Axis 2 *are not* sensitive to geographical aspects of choice. Yet, Axis 2 also describes sites that *are sensitive* to temporal aspects, specifically the ability to compare options based on the 'recency' characteristic. Axis 2 represents an interesting juxtaposition of how choice is facilitated in terms of geography and time.

Axis 3 explained 9.6% of the variance and was interpreted as 'non-transactional / impure market', revealing a class of ToC websites that do not facilitate transactions and do not appear to operate according to a 'pure market' logic. Four variables were retained from Axis 3: 'Transacting choice', 'Number of reviews', 'Deals / specials', and 'Price'.

The 4th axis accounts for 6.5% of variance and four variables were retained: 'Number of reviews', 'Standard search', 'Suggestive search', and 'Price'. Axis 4 was not straightforward to interpret. As Table 5.15 shows, Axis 4 largely appears to characterise whether users can differentiate options on

offer by 'Number of reviews', and also the sophistication of the search functionality ('Suggestive search' versus 'Standard search').

Principal Axis	**Emblematic variables (and categories)**	**Sub-dimension**	**Correlation coefficient estimate**
#1 - Information functionality)	Rating (-)	Characteristics of commensurability	0.3416***
#1	Sortable lists (-)	Presenting options	0.3178***
#1	Reviews (-)	Comparing individually	0.3082***
#1	Filter by (-) features)	Presenting options)	0.3005***
#1	Customer recommendation (-)	Comparing individually	0.2827***
#2 - Geographic insensitivity / temporal) sensitivity)	Search by location (-)	Search functionality	0.2531***
#2	Location (-)	Characteristics of commensurability	0.2347***
#2	Comments (+)	Comparing individually	0.2308***
#2	Customer Q&A (+)	Comparing individually	0.2173***
#2	Recency (+)	Characteristics of commensurability	0.2153***
#3 - Non-transactional / impure market)	Transacting choice (-)	Personalising functions	0.2578***
#3	Number of reviews (+)	Characteristics of commensurability	0.2287***
#3	Deals / specials (-)	Presenting options	0.2203***
#3	Price (-)	Characteristics of commensurability	0.2142***
#4 - Number of reviews / search sophistication	Number of reviews (+)	Characteristics of commensurability	0.1829***
#4	Standard search (-)	Search functionality	0.1412***
#4	Suggestive search (+)	Search functionality	0.1354***
#4	Price (-)	Characteristics of commensurability	0.1186***

Table 5.15: 'Emblematic dataset' resulting from MCA on the Facilitating Choice dimension

5.3.2 Patterns within Dimension 3: 'Knowledge Production'

MCA was performed on 14 dichotomous variables within the 'Knowledge Production' dimension. In this section the results are summarised and the complete analysis and further details are available in Appendix B. MCA generated 21 principal axes and the first three were retained using Cattell's scree test as a rationale for component selection (see Chapter 3).

The first axis explained 18.5% of variance and was interpreted as 'user-generated knowledge'. As Table 5.16 shows, five variables best describe Axis 1, namely: 'Statistics vis-à-vis population', 'Images', 'Textual description', 'Videos', and 'Nominal ratings'. The categories of variables for Axis 1 show that 'users' are a dominant source of knowledge, with some degree of co-production between users and website operators.

The second axis accounted for 11.2% of variance and was interpreted as 'co-produced knowledge', revealing a mode of knowledge production that is similar to Axis 1, but where website operators do not cede as much control over content to users. Three variables were determined to best describe Axis 2: 'Images', 'Textual description', and 'Nominal ratings'. The category 'USER/WEBSITE' is clearly dominant, indicating that knowledge production is shared fairly equally between users and website operators / experts.

The third axis was interpreted as 'presence of external authority', and explained 10.9% of variance. This axis represents to what extent ToC websites appeal to an external authority in order to produce knowledge about the options on offer. Two variables were determined to best describe Axis 3: 'Textual description' and 'Statistics vis-à-vis population'. The category 'AUTH' (i.e., institutional authorities) was dominant for these variables, indicating that this form of empiricism is more dominant for producing knowledge about 'choice'.

Principal Axis	**Emblematic variables (and categories)**	**Sub-dimension**	**Correlation coefficient estimate**
#1 - User-generated knowledge)	Statistics vis-à-vis population (USER)	Types of knowledge	0.6380***
#1	Images (USER/WEBSITE)	Types of knowledge	0.5636***
#1	Textual description (USER/WEBSITE)	Types of knowledge	0.5354***
#1	Videos (USER/WEBSITE)	Types of knowledge	0.4778***
#1	Nominal ratings (USER)	Types of knowledge	0.4365***
#2 - Co-produced knowledge /	Images (USER/WEBSITE)	Types of knowledge	0.4690***
#2	Textual description (USER/WEBSITE)	Types of knowledge	0.4291***
#2	Nominal ratings (USER/WEBSITE)	Types of knowledge	0.4118***
#3 - Presence of external authority	Textual description (WEBSITE/AUTH)	Types of knowledge	0.9642***
#3	Statistics vis-à-vis population (AUTH)	Types of knowledge	0.8016***

Table 5.16: 'Emblematic dataset' resulting from MCA on the Knowledge Production dimension

5.3.3 Patterns within Dimension 4: 'Configuring Users'

MCA was performed on 8 dichotomous variables within the 'Configuring Users' dimension. The results of MCA are summarised here and the complete analysis and details are available in Appendix B. MCA generated 8 principal axes and the first 2 were retained for analysis, although it is noted that the first axis accounts for a very large percentage of the variance (42%).

The first axis was interpreted as 'Individualisation and social interaction', and accounted for 42% of all variance. As shown in Table 5.17, three variables were identified as 'emblematic' in characterising Axis 1: 'Profile details publicly visible', 'User-to-user direct communication', and 'User-to-user evaluation'. It is clear that Axis 1 represents the extent to which users are configured in

a highly individualised and social capacity. Sites that are positioned positively on Axis 1 tend to enable users to log in using their own SNS or social media accounts, and participate within a 'networked public' that expresses their individuality and affords a high degree of interaction and communication with other users.

The second axis accounted for approximately 13% of variance. This axis is straightforward to interpret as it simply characterises sites that do not enable users to have individualised 'user accounts', resulting in only one variable regarded as emblematic. In this way, sites that are positioned positively on Axis 2 configure users in the style of anonymous readers, rather than unique individuals in a social setting.

Principal Axis	**Emblematic variables (and categories)**	**Sub-dimension**	**Correlation coefficient estimate**
#1 - Individualisation and social interaction	Profile details publicly visible	Individualisation	0.5654***
#1	User-to-user direct communication	Networked publics	0.5600***
#1	User-to-user evaluation	Networked publics	0.5318***
#2 - User accounts	User accounts (-)	Individualisation	0.5388***

Table 5.17: 'Emblematic dataset' resulting from MCA on the Configuring Users dimension

5.3.4 Examining patterns within the 'emblematic' dataset

As specified in the methodology (see Chapter Three), MCA was performed on the most 'important' variables that exhibit the highest correlation on the principle axes that were retained as a result of MCA (performed in the previous analyses of Dimension 2, 3, and 4). These variables are regarded as 'emblematic' in describing each axis that was retained in the previous MCA, providing the strongest insights when interpreting the results of MCA. Furthermore, the 10 variables in the 'Having Choice' dimension were included in the MCA in this section as supplementary variables. This means that the 'Having Choice' data were included in MCA but 'held out' from the calculation of eigenvalues (i.e., the final calculations). In other words, the 'Having Choice' variables were 'super-imposed' onto the MCA results, providing a deeper understanding of the patterns of how choice is shaped. The results of MCA on the 'emblematic dataset' are summarised and further details are available in Appendix B.

The first principal axis described 16.8% of variance in the emblematic dataset and was labelled as ’Produsage / High-information’. Table 5.18 shows the correlation coefficient estimates of the most important categories on Axis 1 (positive estimates), as well as the categories that are estimated to least characterise Axis 1 (negative estimates). On the positive side of Axis 1, sites tend to enable users to ’produse’ choice by contributing content (Bruns, 2011), and these sites also present users with a large economy of information to facilitate their decision making. On the negative side of Axis 2 are sites that do not enable users to contribute content, and these sites also present users with a relatively small economy of information to interact with. It may seem intuitive to label the negative side of Axis 1 as ’Usage / Low-information’, to reflect the ‘opposite’ of the positive side of Axis 1. Whilst this is largely true, it is noted that sites located at the extreme negative direction of Axis 1 do not necessarily always provide ‘low-information’, but also tend to provide ‘no information’. As Table 5.18 shows, the ‘NONE’ category specifies that certain fundamental types of knowledge are non-existent within the landscape of choice of sites at the extreme negative of Axis 1.

Table 5.16 reveals that 10 out of 12 variables are related to ‘knowledge production’, meaning that this dimension of the conceptual framework is the most important for describing Axis 1. Moreover, these variables tend to have the category ‘USER’, indicating that the positive side of Axis 1 characterises sites where users co-produce knowledge about ’choice’. Further, it is evident that the positive side of Axis 1 describes ToC websites that provide a high amount of information about the options on offer within the landscape of choice, heavily utilising multimedia types of knowledge (e.g., images, videos) as well as ‘reviews’ and ‘ratings’. Turning attention to the supplementary variables, sites in the ’retail’ supersector obtain a very high correlation on Axis 1. Caution must be taken interpreting this result, however, given the very low count of sites in the dataset with this category. However, there is a logic to this finding, given that sites such as fiverr.com and peopleperhour.com are effectively open global marketplaces where users can buy and sell their own services (e.g., graphic design). In this way, the website operators function as ‘hands off’ brokers, whilst content on the site is almost completely user-generated. Interestingly, the variable categories that are highly *negatively* correlated Axis 1 all belong to the Knowledge Production dimension of the conceptual framework (see Table 5.18). On the negative side of Axis 1 it is observed that knowledge about the options on offer is dominantly constructed in statistical terms, indicated by the high estimates for ‘Statistics vis-à-vis population’ (Table 5.18). For example, knowledge produced by the website operators and/or ‘experts’ is deployed for ‘Statistics

vis-à-vis population', enabling users to compare between options based on some 'population' metric (e.g., interest rates for credit cards on banking sites).

Variable and category	**Estimate**	**Dimension**
Videos_USER	0.4857***	Knowledge Production
Ratings...nominal_USER	0.4731***	Knowledge Production
Textual.description_USER	0.4490***	Knowledge Production
Images_USER	0.4403***	Knowledge Production
Statistics..vis.a.vis.population._USER	0.4384***	Knowledge Production
Textual.description_USER/WEBSITE	0.4317***	Knowledge Production
Rating_+	0.4223***	Facilitating Choice
Reviews_+	0.4081***	Facilitating Choice
Statistics..vis.a.vis.population._AUTH	-0.4988***	Knowledge Production
Images_NONE	-0.5966***	Knowledge Production
Textual.description_NONE	-0.6091***	Knowledge Production
Statistics..vis.a.vis.population._WEBSITE	<-0.6137***	Knowledge Production

Table 5.18: The 'most important' (positive) and 'least important' (negative) correlated categories of variables on Axis 1

Axis 2 explained 12.5% of variance for the emblematic dataset and was labelled 'Appeal to external authority'. As Table 5.19 shows, the positive side of Axis 2 describes ToC websites that appeal to an external authority in order to construct knowledge within the landscape of choice, whilst the negative side of Axis 2 is marked by 'produsage' processes where knowledge is co-produced by users and website operators ('Textual description') and the absence of certain types of knowledge ('Videos' and 'Statistics vis-à-vis population'). Turning attention to the supplementary variables, it is no surprise that ToC websites in the health category are strongly positively correlated on Axis 2. As discussed in Chapter Four, appealing to external authorities legitimises the knowledge claims that are made about the options on offer in a given ToC website. Clearly for health ToC websites this is constitutive of medical expertise and peer-reviewed scientific literature, which are held to provide 'objective' knowledge about health and wellness (e.g., pharmaceutical options, options for treatment of ailments and disease).

Categories that are *negatively* correlated on Axis 2 are not simply characterised as 'appealing to crowd-sourced knowledge' (i.e., users), which one might regard as the 'opposite' of appealing to external authority. What we observe is that the opposite of Axis 2 are sites that do not deploy 'statistics vis-à-vis population' or 'videos' at all. This reinforces that statistical modes of knowledge are very important for describing Axis 2, and suggests that rich multimedia content is also a key factor for such sites (i.e.,

it is rarely the case that videos are not deployed in some capacity). This makes sense given that videos can provide significant amount of information when explaining complex health-related issues. In a similar way, it is noted that users are very rarely enabled to co-produce 'Textual descriptions' for sites associated with Axis 2. In terms of health-related ToC websites there is a clear explanation for this: only expert and authoritative sources of knowledge can make legitimate truth claims about the options on offer that users are comparing between.

Variable and category	**Estimate**	**Dimension**
Textual.description_WEBSITE/AUTH	0.6496***	Knowledge Production
Statistics.vis.a.vis.population_AUTH	0.4677***	Knowledge Production
Textual.description_USER/WEBSITE	-0.3535***	Knowledge Production
Videos_NONE	-0.3556***	Knowledge Production
Statistics.vis.a.vis.population_NONE	-0.4060***	Knowledge Production

Table 5.19: The 'most important' (positive) and 'least important' (negative) correlated categories of variables on Axis 2

The third principal axis accounts for 8.4% of variance. It is difficult to describe Axis 3 based solely on the variable categories. However, taking into consideration the supplementary variable categories, Axis 3 was interpreted as 'Produsage / Broker Sites'. As Table 5.20 shows, Axis 3 is characterised by sites that enable users to generate a wide variety of content, and user-generated statistical forms of knowledge are highly correlated on Axis 3. There is a logic to this finding, given that sites in the 'real estate' (0.6138***) and 'employment' (0.4247***) sectors have high estimates on Axis 3. These sites are interpreted as a kind of 'broker' model of ToC website, whereby the landscape of choice is largely produced by users (e.g., advertising jobs, listing properties for sale). The role of 'statistics vis-à-vis population' enables users to provide statistical information that can then be deployed by the website to enable statistical comparisons between the options on offer against some population metric. For example, ToC websites in the real estate sector enable users to compare average house prices within a particular area, which is often calculated using the data provided by users (i.e., who sell houses through the website). Sites in the 'employment' sector utilise a similar approach whereby users are able to compare average incomes for different kinds of jobs, which is statistical information derived from the 'population' of jobs on offer through the website.

The 4th principal axis describes 7% of variance and is interpreted as 'External authority / impure market'. As Table 5.21 reveals, the variable that best characterises Axis 4 is 'statistics vis-à-vis population' with the category 'AUTH' (i.e., derived from 'authoritative' sources). Government ToC

Variable and category	Estimate	Dimension
Statistics.vis.a.vis.population_USER/WEBSITE	0.4438***	Knowledge Production
Images_USER	0.4098***	Knowledge Production
Statistics.vis.a.vis.population_USER	0.4022***	Knowledge Production
Textual.description_USER	0.3315***	Knowledge Production
Textual.description_WEBSITE	-0.3323***	Knowledge Production
Videos_USER/WEBSITE	-0.3391***	Knowledge Production
Textual.description_USER/WEBSITE	-0.3456***	Knowledge Production

Table 5.20: The 'most important' (positive) and 'least important' (negative) correlated categories of variables on Axis 3

sites are strongly associated with Axis 4, evidenced by the supplementary variables (see Appendix B). It is also observed that Axis 4 is associated with health-related ToC websites that draw upon expert and authoritative sources to produce knowledge about the options on offer. The term 'impure market' is also used to interpret Axis 4 because the types of sites that are correlated on this axis tend to provide 'choice' in an impure or quasi-market context. The complete coefficient estimates (see Appendix B) show that market-oriented ToC features such as 'transacting choice', 'price', and 'deals / specials' are rarely observed for sites on Axis 4. It is not clear why 'videos' co-produced by website operators and users is correlated on Axis 4, although the complete results (see Appendix B) reveal that sites in the 'recreation' category are weakly correlated on Axis 4, which may provide one explanation.

Variable and category	Estimate	Dimension
Statistics.vis.a.vis.population_AUTH	0.5075***	Knowledge Production
Videos_USER/WEBSITE	0.3452***	Knowledge Production
Textual.description_WEBSITE/AUTH	0.3048***	Knowledge Production
Textual.description_USER	-0.2415***	Knowledge Production
Textual.description_WEBSITE	-0.2436***	Knowledge Production
Statistics.vis.a.vis.population_USER/WEBSITE	-0.2664***	Knowledge Production

Table 5.21: The 'most important' (positive) and 'least important' (negative) correlated categories of variables on Axis 4

5.3.5 ToC on the web: a tale of two 'clusters'

Hierarchical clustering was performed on the 'emblematic dataset', using the 4 principal axes retained and interpreted in the previous section. The optimal number of clusters was calculated at 2 and Figure

5.1 shows the projected positions of the sites in respect to the two clusters. As discussed in Chapter Three, the optimal number of clusters was derived using the methods described by Husson et al. (2015; see also Husson et al., 2010).

There were 74 sites assigned to Cluster 1 (40% of all sites) and 109 sites assigned to Cluster 2 (60% of all sites). Attention is turned to how each cluster was constructed in respect to the variable categories. The findings are summarised here and the complete results and further details are included in Appendix B. Furthermore, the two clusters are named 'Delimited and Objective ToC' (Cluster 1) and 'Produsing ToC' (Cluster 2). These names and their rationale is not discussed in detail in this section, but is taken up in Chapter Six. In this way, the next chapter discusses the two clusters with respect to the over-arching mandate of the study, that is, how choice is constructed and governed on the web through ToC.

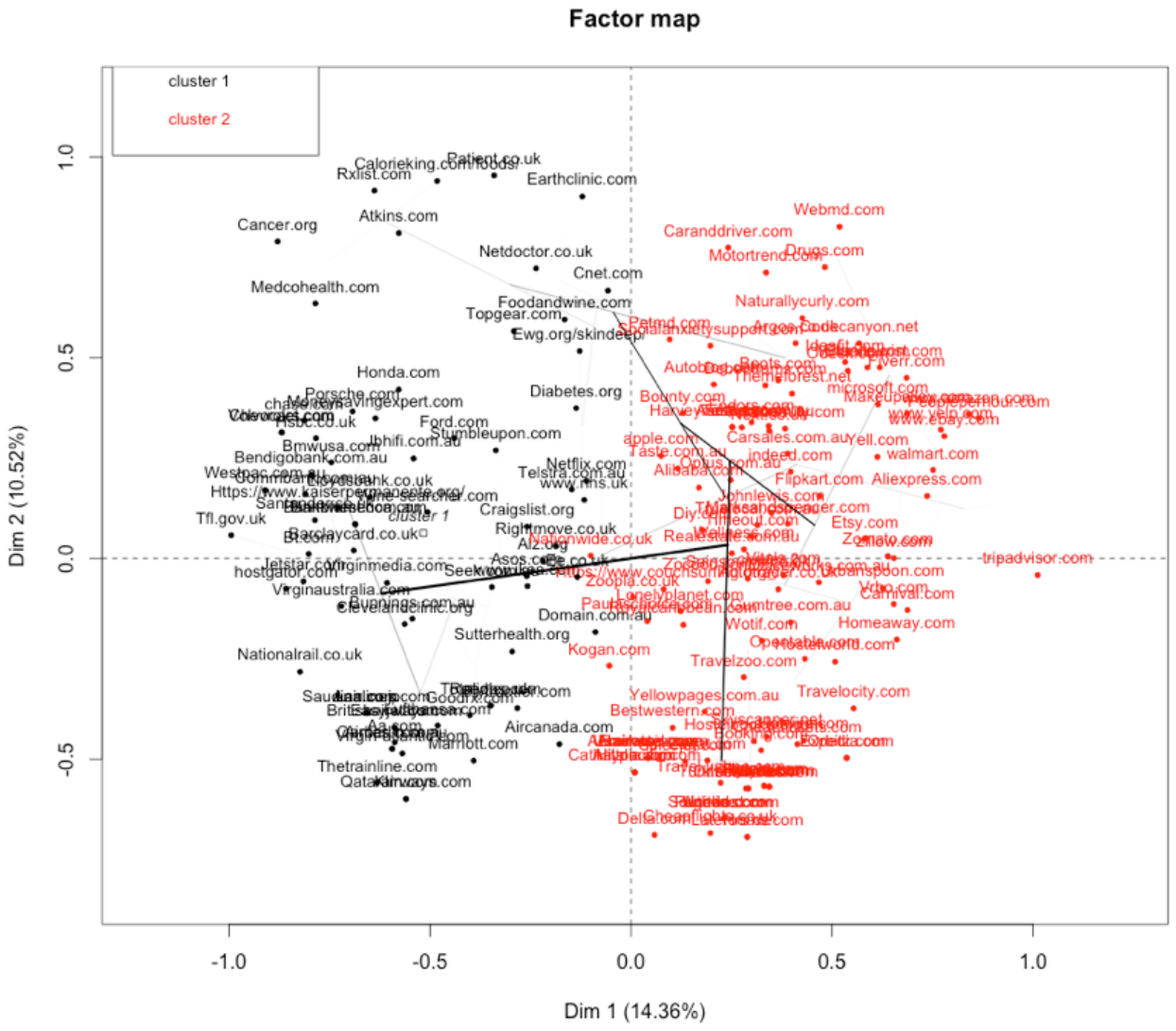


Figure 5.1: Factor map showing 2 'clusters' of websites projected onto Axis 1 and Axis 2 of the 'Emblematic' MCA data.

Cluster 1 - 'Delimited and Objective ToC'

ToC websites in Cluster 1 configure users primarily as passive consumers of information who are not able to co-produce content within the website or participate as unique individuals within networked publics. Most sites in Cluster 1 do not enable users to *interact with each other* (92% of sites in Cluster 1 versus 68% for all sites in the sample), or enable users to *evaluate each other* (96% versus 64%), or *publicly display personal profile information* (89% versus 62%). Indeed, of all the sites in the study sample that do not enable users to have their own *user accounts*, 100% of these sites are classified into Cluster 1.

Sites in Cluster 1 tend to provide a relatively low amount of information about the options on offer. For example, 'reviews' and 'ratings' are highly underrepresented for sites in Cluster 1. In this way, 82% of sites in Cluster 1 do not deploy 'reviews' (compared to 31% of all sites), and 70% of sites do not deploy 'ratings' (compared to 31% of all sites). Similarly, 100% of the sites that do not deploy 'images' belong to Cluster 1 and images are heavily underrepresented in this cluster. Where images are deployed these tend to be generated solely by the website operators, rather than co-produced with users (65% of sites in Cluster 1 restrict who can generate images versus 47% of all sites).

It is also found that sites in Cluster 1 tend to retain a large degree of 'curatorial control' over the landscape of choice provided through the web space. This is evident due to the over-representation of the 'WEBSITE' category for the production of knowledge (i.e., knowledge derived through the website operators rather than users). For example, sites in Cluster 1 that utilise 'statistics vis-à-vis population' are nearly twice as likely to generate such statistical knowledges using only information provided by the website operators. Similarly, 'textual descriptions' tend to be authored solely by the website operators rather than co-produced with users and/or external authorities (76% for Cluster 1 compared to 53% of all sites).

Websites in this cluster tend to appeal to external authorities in order to produce 'true' or legitimate knowledge about the options on offer, as evidenced by the over-representation of 'AUTH' and 'WEBSITE/AUTH' categories. ToC websites in this cluster tend to utilise statistics generated by expert authorities and/or independent regulators in order to provide 'objective' choice. This suggests that sites in Cluster 1 may seek to retain curatorial control over the web space in order to mitigate dissenting opinions or control information that may be counter to the rationalities of the website operators. Indeed, the 'scale of choice' in Cluster 1 is often delimited to 'brand', meaning that the options on offer are limited to particular brands (e.g., ikea.com or apple.com). 55% of sites in Cluster 1 scale choice to 'brand' compared to 28% of all sites in the study sample. At the same time, sites in Cluster 1 are underrepresented in terms of providing choice at a 'global' scale (20% of sites in Cluster 1 provide choice at a 'global' scale).

Cluster 2 - 'Produsing ToC'

ToC sites in Cluster 2 tend to configure users as 'produsers' (Bruns, 2011), who not only use the web spaces but also play an active role in producing them. Although this idea is discussed further in the next

chapter, the observations provided in this section will provide a basis for this claim. User-generated 'reviews' and 'ratings' are an almost ubiquitous feature of sites in Cluster 2, deployed by 95% and 97% of sites, respectively (compared to 64% and 70% of all sites in the study sample). For Cluster 2, users play a key role in producing knowledge and co-curating ToC within the website. At the same time, Cluster 2 also reveals a mode of knowledge production that depends *solely on user-generated content*, where some websites in Cluster 2 not only share control over content with users, but also in a variety of cases depend solely upon users in order for the 'landscape of choice' to exist (i.e., the options on offer are created by users themselves, including the knowledge about these options).

In contrast to Cluster 1, sites in Cluster 2 tend to provide a rich and expansive economy of information relating to the options on offer. Users are presented with a complex array of information - often user-generated - to enable comparisons between options, along with relatively sophisticated tools that enable users to navigate this information in order to compare between options. A key aspect of this involves sorting information algorithmically, not only to make comparison possible (i.e., to render different options commensurable) but also proactively in presenting the user with recommendations and an individualised experience that is sensitive to their individual needs and preferences. When users are configured to co-produce a vast amount of statistically calculable data, the web space must provide functionality to sort through this knowledge economy, to regulate it in a manner consonant with the rationalities of the website operators, and to ensure the continuing function of the web space as a whole. This is discussed further in Chapter Six.

Sites in Cluster 2 also tend to provide choice at a 'global' scale (78% versus 58% for all sites in the study sample). This differs from Cluster 1 whereby the options on offer are often delimited to a particular scale (e.g., scaling to 'brand', such as Ikea or Ford). There appears to be a logic to this finding, whereby the website operators are impelled to provide the 'most useful' tools for users to navigate an immense 'global' field of choice. For sites such as yelp.com we observe that there is a desire to achieve the largest 'global' coverage possible, in this case to enable users to compare local businesses all over the world. The knowledge economy that ToC websites in Cluster 2 must regulate and administer - in other words *govern* - is complex and vast.

5.4 Conclusion

This chapter was guided by two main research questions. First, how widespread are ToC on the web and what are their patterns of distribution? Second, what different types of ToC are identifiable and to what extent do they shape choice differently?

The findings presented in this chapter reveal that ToC is a widespread and important phenomenon, representing a key aspect of the contemporary web. ToC tend to be deployed largely in the context of recreational services (travel and leisure) and consumer goods (personal and household goods), positioned in commercial markets. However, ToC are also influential in other contexts in which choice is exercised. In Australia and the UK, ToC websites constitute about one-third of the top-ranking sites. ToC are also deployed within about one third of sites in a health context, though health-related ToC websites tend to be constructed differently to the majority of ToC websites. Governments also deploy ToC to provide choice in public services, although government ToC websites are highly under-represented at present.

ToC most commonly enable comparisons between 'services' (e.g., hairdressers, restaurants, graphic design) rather than 'goods' (e.g., laptops, books). This finding sheds new light on marketing and business literature that tends to focus on 'product comparison'. It is also found that around a third of ToC websites 'scale down' the options on offer, most often to offer a particular brand of goods or services, and sometimes in accordance with contractual arrangements. Perhaps paradoxically, website operators that deploy ToC construct the perception of 'global' or all-inclusive choice, even when the options on offer are moderately (or extremely) delimited. A key issue is that ToC users may feel that they 'have choice' when presented with options to compare between, when in fact the set of options is limited (and/or the users' capacity to choose is limited). The two clusters of ToC provide further insight. Commercially-oriented sites in Cluster 1 tend to provide delimited choice (e.g., by 'brand' or 'geography'), whereas sites in Cluster 2 tend to provide choice at a global scale.

The majority of ToC websites in Cluster 2 do not configure users as 'passive' readers, but rather position them as unique individuals participating in networked publics that stretch out in the social media landscape. The ability to create a user profile is an almost universal feature of ToC websites in Cluster 2. Commercially-oriented ToC websites in Cluster 2 tend to configure users as 'produsers', and for these websites 'choice' is reactive to the individuality and social capacities of users. For Cluster

1, ToC websites do not tend to subjectify and individualise users in this way. These sites, which are often in the areas of health and banking, tend to configure users as a kind of 'passive reader'.

The two clusters of ToC differ fundamentally in terms of how 'legitimate' knowledge is produced about the options on offer. Websites in Cluster 1 tends to produce knowledge by drawing externally on experts and authoritative sources, often presented in the form of statistics and textual descriptions about the options on offer. In contrast, websites in Cluster 2 tend to produce knowledge internally by configuring users as 'produsers' who are able to create content and collectively generate knowledge about the options on offer. Primarily, this occurs *directly* through ratings and reviews, and *indirectly* via the data generated through navigating, sorting, ranking, and transacting choice (using the functionalities provided).

In the next chapter I build upon these findings to undertake a discussion of how ToC shape and govern choice differently through two 'ToC modalities' that reflect the two clusters presented in this chapter. I argue that there are three key themes that emerge from the analysis and findings presented in this chapter, which provide a basis to understand how ToC govern choice differently in respect to epistemology, individualisation of subjectivity, and political economy.

Chapter 6

Modalities of Governing Choice

6.1 Introduction

The previous chapter demonstrated that there are different patterns to how ToC are deployed throughout the web—the distribution is not random—it has form and shape. The findings in Chapter Five suggested that there are two broad 'clusters' of ToC, but with considerable variation within each. In this chapter I discuss how these two clusters constitute two 'modalities of ToC', representing two distinct ways that choice is governed on the web through ToC. The first modality is described as *Delimited and Objective ToC*, and the second modality is described as *Produsing ToC*. The goal of this chapter is to examine these two modalities further, and in doing so undertake a discussion of the central mandate of this study: how do ToC shape and govern choice? The two modalities of ToC are examined with respect to key 'exemplar' ToC websites that illustrate how the affordances of ToC shape or govern choice. This process engages with a broader question that arises from the research questions of the study - how ToC are enrolled socio-technically in the production and governance of choice and choosers. The discussion is structured under three sections that reflect three inter-related themes that emerge from the analysis.

Throughout this chapter, key websites from the study sample are drawn on as examples to discuss the findings. These websites have a special relationship to the two clusters presented in Chapter Five. In this way, the analysis conducted in Chapter Five provides statistical information about which websites

are most central to each 'cluster' (these websites are termed the 'paragon' sites), as well as the websites that are most distant from the other clusters (termed the 'ideal' sites). In other words, the 'paragon' sites are in the center of the clusters in Figure 5.1, whilst the 'ideal' sites are on the periphery of the cluster (furthest from the other cluster). For the purposes of this chapter, 'paragon' sites provide an 'average' example of how choice is structured by sites in each cluster, whereas 'ideal' sites provide a kind of 'ideal type' (Weber, Roth, & Wittich, 1978; Cahnman, 1965) or extreme example of how choice is structured by sites in each cluster.

6.2 Governing choice through ToC: two 'modalities'

Despite the diverse taxonomy of ToC features presented in Chapter Four and surveyed in Chapter Five, the previous chapter demonstrated that there are two broad patterns in the way that ToC features are deployed. The deployment of specific sets of ToC features obtains strategic importance for website operators as they seek to govern individuals and collectives who visit the web space. ToC do not 'determine' the action of choosing, but *shape and govern* the discursive and interactive socio-technical space in which choice is exercised (i.e., websites in this study), in mutually beneficial relationships for website operators and users.

The deployment of ToC can be broadly characterised into two types or 'modalities', as reflected in the two clusters presented in the previous chapter (Section 5.3.5). The first modality is named 'Delimited and Objective ToC' and the second modality is 'Produsing ToC'. Table 6.1 provides an overview of the different characteristics of the two modalities of ToC. I argue that three themes emerge from the analysis, which help to cohere and explain how the ToC modalities govern choice differently in respect to the key characteristics outlined in Table 6.1. These themes are inter-related in the sense that there is some overlap between them. However, each theme elicits unique insights that contribute to understanding how choice is governed differently through the two ToC modalities.

The first theme, *Epistemologies of ToC*, examines how ToC are enrolled in 'games of truth' from two different forms of empiricism that differentially frame what is a good/best choice versus a bad/poor choice. These games of truth occur with respect to two forms of empiricism that are broadly identified as 'expert/authoritative' (the 'Delimited and Objective ToC' modality) versus 'produsage'

Delimited and Objective ToC	**Produsing ToC**
Theme 1: Epistemologies of ToC	
Providing users with 'objective' choice	Driving users towards making a transaction, being satisfied, and retaining user attention
Expert knowledge (*external to* the website	Crowd wisdom / crowd-sourced knowledge (*internal to* the website
Statistics	Ratings
Knowledge curated by website operators / expert authorities	Knowledge curated by algorithmic sorting / produsage processes
Theme 2: Individualisation and Subjectivity of ToC	
Users as 'passive readers'	Users as 'produsers'
Web 1.0 logic	Platform logic
Users as homogeneous / undifferentiated	Users as individuals (individualisation)
Theme 3: Political Economies of ToC	
Production versus consumption	Prosumption
Delimited scale of choice	Global scale of choice

Table 6.1: Characteristics of the two modalities of ToC

(the 'Produsing ToC' modality). The production of truth or 'veracity' of information is linked to different processes of knowledge production for each modality. In turn, the epistemologies of ToC are linked to the raison d'être of website operators in their attempts to govern users' choice. In this respect, the affordances of the 'Delimited and Objective ToC' modality are more about providing users with 'objective' choice that is actioned elsewhere (e.g., comparing treatment options for illnesses), while the affordances of the 'Produsing ToC' modality are more about driving users towards making a transaction and being satisfied with their experience in order to gain and retain user attention and activity. For the 'Produsing ToC' modality, choice is *co-governed* alongside users through 'produsage' processes that draw on the 'wisdom of the crowds' (Surowiecki, 2004). As discussed in Chapter Two, Bruns' notion of 'produsage' broadly describes the multi-directional flows of information that characterise the user-led content-creation environment of the contemporary web (Bruns, 2008a). The dualism of the user qua consumer of web content versus user qua producer of web content does not account for the 'blurring' of roles that users have, whereby they can "switch easily and effortlessly between these two roles—allowing, ultimately, for the emergence of a hybrid role in between: that of the produser" (Bruns & Schmidt, 2011, p. 3-4). Positioning the second modality in terms of 'produsage' enables a better understanding of how its epistemology differs from

the 'Delimited and Objective ToC' modality, while also attending to users, who are configured as 'produsers'.

Following this, a second theme, *Individualisation and Subjectivities of ToC*, examines how ToC configure users through differing processes of individualisation. The two modalities of ToC govern individuality differently according to the raison d'être of website operators: "there is an interplay between individualization and governmental processes" (Henman, 2007, p. 172). I argue that the 'Delimited and Objective ToC' modality largely configures users as homogeneous and undifferentiated, whereas the 'Produsing ToC' modality configures users as individuals with unique attributes and social roles within Web 2.0 'platform' environments (Blank & Reisdorf, 2012). For the latter modality, the 'landscape of choice' through the website shifts in response to individuals' activities and personalised characteristics. Unlike the 'Delimited and Objective ToC' modality, the 'Produsing ToC' modality is reactive to individuality, and attempts to link up individual subjectivities with the raison d'être of the website operators. ToC work with, and through, the individuality of users in order to construct and govern choice in line with the interests of the website operators. Likewise, users work with, and through, ToC in order to navigate choice and compare between options in line with their individual interests and ethics.

The third theme, *Political Economies of ToC*, problematises the two modalities of ToC in relation to global markets and economic systems, including the role of users and website operators. Drawing on the work of Ritzer and Jurgenson (2010), I argue that the two modalities of ToC broadly reflect 'producer and consumer' capitalism versus 'prosumer' capitalism. In this way, the 'Delimited and Objective ToC' modality largely operates in a traditional producer and consumer model, whilst the 'Produsing ToC' modality positions users as 'prosumers' or active co-participants of the production process. The somewhat paradoxical implication is that the 'Produsing ToC' modality not only helps individuals navigate choice, but at the same time produces *more* choice than ever before at a global scale. For this modality, choice is configured as 'participatory' - it is, at least partly, an emergent 'network effect' of the underlying platforms (Blank & Reisdorf, 2012, p. 538). On the other hand, the affordances of the 'Delimited and Objective ToC' enable website operators to construct the feeling of 'informed choice' whilst actually narrowing down or *delimiting* the scale and range of choice on offer (e.g., to a particular brand or set of brands).

6.3 Epistemologies of ToC

A key question of how choice is governed through ToC concerns how 'true' discourse is produced and maintained. It is not sufficient for a website to simply state, "*this* service is a better choice than *that* service". There must be mechanisms in place that contribute to creating the conditions by which discourse can pass (or be rejected) as 'truth'. This is a crucial problem that ToC design to resolve, as evidenced in Chapter Five by the particular importance of ToC features in the 'Knowledge Production' dimension (see Section 5.3.4). Chapter Two discussed how ToC produce knowledge through practical facilities of classifying, sorting, differentiating and order (see Section 2.5.3). The findings of this chapter require a further step to discuss how this knowledge is constructed as *legitimate* or 'true'. For Foucault, 'truth' "is to be understood as a system of ordered procedures for the production, regulation, distribution, circulation and operation of statements" (Foucault, 1980, p. 193). He developed the notion of 'games of truth' to examine the role and conditions of truth in relation to power: "when I say 'game' I mean an ensemble of rules for the production of truth ... It is an ensemble of procedures which lead to a certain result, which can be considered in function of its principles and its rules of procedure as valid or not, as winner or loser" (Gauthier, 1988, p. 15). In this way, games of truth are intimately linked to knowledge production through ToC, reflecting how choice is governed. Users qua subjects are configured within and governed through the games of truth that characterise the two modalities of ToC. For the 'Delimited and Objective ToC' modality, valid knowledge is defined as scientific-like knowledge based on *independent* experts through *external* robust procedures. For the 'Produsing ToC' modality, valid knowledge is defined as authentic *user experience* of everyday people, regulated through *internal* robust procedures.

6.3.1 Truth through reason: the 'Delimited and Objective ToC' modality

Broadly, the 'Delimited and Objective ToC' modality follows a strategy of governing choice that resonates with the notion of 'veridical discourses', defined as the "truth procedures and pronouncements of objective, positive or scientific discourses" (Rose, 1999, p. 30). For this modality, 'truth' tends to be produced through reason and objectivity, particularly through expertise and statistics. As identified in Chapter Two (Section 2.5.3), this also accords with Blank's notion of 'procedural reviews', constitutive of well-defined tests and standardised procedures, but also in some

instances 'connoisseurial reviews' authored by singular experts (Blank, 2007). In exploring this further, two websites are used to illustrate the discussion: one ideal site, *patient.co.uk*; and one paragon site, *virginmedia.com*.

The over-arching telos of patient.info is to provide information and tools for users to make choices about treatments for particular health and medical conditions. It is a not-for-profit website, constructed and edited by EMIS Health, a company that supplies electronic patient record systems in the UK and is funded through the NHS. There is no strong commercial logic underpinning this website. The scale at which choice is provided is 'global', in this case meaning that the options on offer are considered by the medical experts as representing the complete range of possible options for medical and health-related decisions.

This site has a strong focus on textual descriptions constructed and edited by medical practitioners, and 'decision aids' that assist users to make choices in relation to health. These decision aids are provided either externally through other authoritative ToC websites (e.g., nhs.uk), or as 'option grids', which are interpreted in this study as 'side by side' ToC (see Section 4.3.2). For example, the 'option grid' for hip osteoarthritis provides a 'side by side' comparison of non-operative treatment versus hip replacement surgery (Figure 6.1). The affordances of this 'side by side' ToC enable users to quickly weigh up the 'pros' and 'cons' of different types of treatment. There is a strong reliance on numbers and statistical forms of knowledge generated by experts, reflecting the logic of 'procedural reviews'[1] (Blank, 2007). For example, the information presented in the 'side by side' ToC often includes a percentage of how many people in the population expressed satisfaction with a particular form of treatment.

In stark contrast to the 'Produsing ToC' modality, there is almost no user-generated knowledge on Patient.info, although notably there is a separate section on the website that includes a discussion forum (which, as already outlined in Chapter Four, is not considered as a feature of ToC in this study). A key rationality of the website is to provide expert, peer-reviewed information supported by recognised medical science, and the website operators do not wish to facilitate an economy of knowledge that includes the subjective experiences of the general public. This makes sense and is perhaps self-evident, but it also serves to demonstrate how the website operators strategically 'shut down' or foreclose any

[1] At the same time, there is also often a dependence on 'textual descriptions', which are not reflective of procedural reviews in Blank's view (2007, p. 38). Further, these textual aspects appear to exhibit, at least partially, a kind of 'connoisseurial' logic that reflects the 'refined judgment' of the author and in this way exemplifies the 'mixture' of Blank's two systems of ratings and reviews (2007, pp. 28-29)

option grid

Hip osteoarthritis: treatment options

Use this grid to help you and your healthcare professional talk about how best to manage your hip pain and activity level. The first steps are to become as fit as possible, work to approach your ideal weight, and consider trying physical therapy. Surgery is normally recommended only after non-operative treatments have been tried.

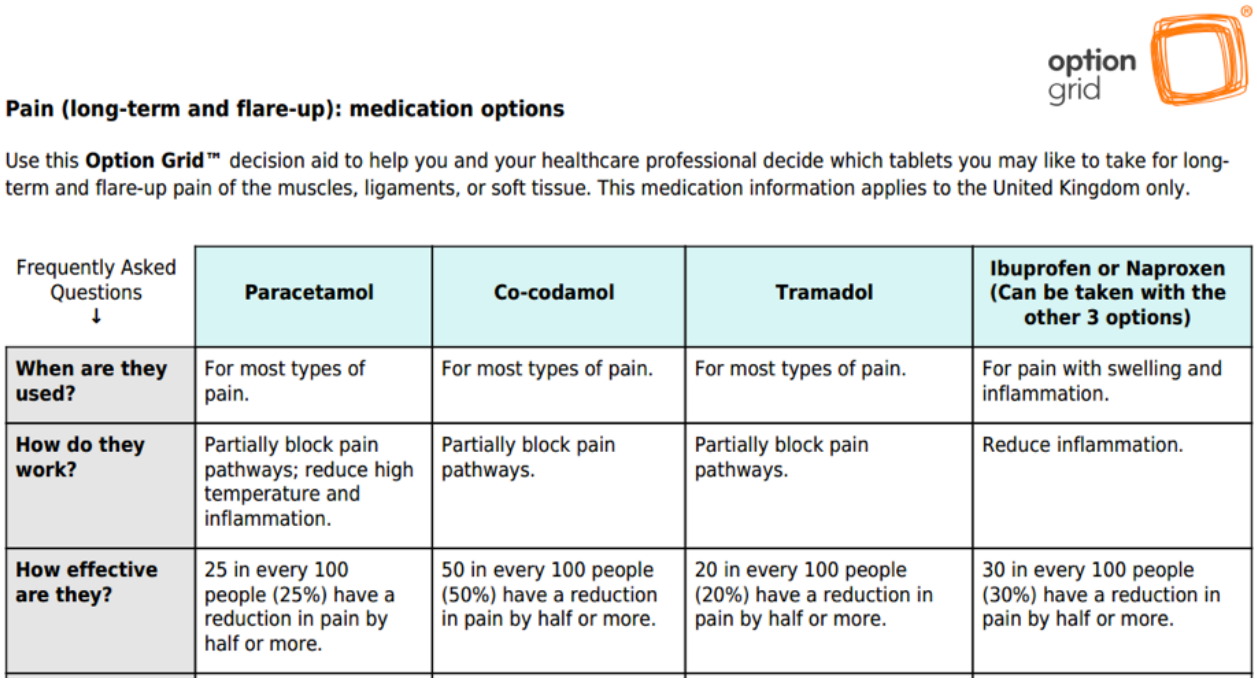
Frequently Asked Questions	Non-operative treatment	Hip replacement surgery
Will this reduce the pain I have in my hip?	It depends on who you are and which of the many possible treatments you try. You should talk to your clinician about which treatments might work best for you. Tablets like paracetamol, ibuprofen (NSAIDs), and tramadol as well as steroid injections may be recommended.	Three months after having surgery, around 84 in every 100 people (87%) say they are very satisfied with how the surgery improved their level of pain. One year after surgery, around 87 in every 100 people (87%) say they are very satisfied with how the surgery improved their level of pain.
Will this treatment improve my ability to be active?	It may. As you get pain relief, you should be able to be more active and this in turn can also help to reduce pain. It may help to take pain relievers before being physically active.	Yes, the vast majority of patients experience improvement in their activity level. However, not everyone is satisfied with the improvement in their ability to perform some strenuous activities.
Are there any risks to this treatment?	All medications have some side effects. For example, codeine may lead to constipation and prolonged use of tablets like ibuprofen (NSAIDs) increases your risk of developing stomach bleeding, high blood pressure, and heart or kidney problems. Around 2 in every 100 people (2%) who receive a steroid injection will	Among those over 65 years of age, roughly 3 in every 100 people (3%) experience a serious medical complication after surgery such as infection, bleeding, blood clots in the legs or lungs, heart attack, or death. Rare but possible surgical complications include dislocation, fracture, and leg length inequality. The risks of

Figure 6.1: 'Side by side' decision aid on Patient Info

kind of user-generated knowledge through the strategic deployment (or indeed lack of deployment) of particular features of ToC, such as user-generated ratings and reviews, or user-generated images and videos. The information presented is highly regulated and curated, and appeals to external authority and expert sources of knowledge. For example, each 'option grid' contains a footnote with the names of the editors, the evidence document, publication date, expiry date, ISBN, and content license.

Rose argues that individuals engage with expert and authoritative knowledges in order to govern and relate to themselves, which, drawing on Canguilhem, he terms 'veridical discourses' (Rose, 1999a, p. 30). For example, an individual may wish to assess their general health, so they visit a registered doctor, who has obtained qualified expertise in medical science. The doctor is appointed to determine the 'truth' about the individual's health. The doctor's expertise is constitutive of a veridical discourse that has a relation to truth concerning the individual, his/her body, and medico-scientific literatures that are "regulated meticulously by procedures of training, credentialization and control of the apparatus of

publications" (Rose, 1999a, p. 281). For the 'Delimited and Objective ToC' modality, the strategic use of expertise affords website operators to produce knowledge about the options on offer by appealing to external 'objective' authorities that produce truth through veridical discourse. Using the example of Patient.info, this suggests that the expertise of medical professionals, and in particular statistical knowledge derived from veridical discourses, are enrolled in a 'game of truth' in which individuals are able to compare health treatments and interventions in order to make the 'best' choice for them. For example, returning to the 'option grid' discussed previously, an individual may be experiencing long-term pain in their shoulder muscles. Figure 6.2 shows an excerpt of the 'side by side' comparisons for treatment options relating to this condition. As the page specifies, the information presented for each option (e.g., paracetamol versus co-codamol) is "developed by a Collaborative of 150 medical experts, researchers and patients". Thus, users are positioned in a game of truth where they make difficult choices about their health (in this case long-term pain). The knowledge they draw upon derives from veridical discourses constitutive of medical expertise, which resonates with 'procedural' reviews (Blank, 2007) of the options on offer.



Pain (long-term and flare-up): medication options

Use this **Option Grid™** decision aid to help you and your healthcare professional decide which tablets you may like to take for long-term and flare-up pain of the muscles, ligaments, or soft tissue. This medication information applies to the United Kingdom only.

Frequently Asked Questions ↓	**Paracetamol**	**Co-codamol**	**Tramadol**	**Ibuprofen or Naproxen (Can be taken with the other 3 options)**
When are they used?	For most types of pain.	For most types of pain.	For most types of pain.	For pain with swelling and inflammation.
How do they work?	Partially block pain pathways; reduce high temperature and inflammation.	Partially block pain pathways.	Partially block pain pathways.	Reduce inflammation.
How effective are they?	25 in every 100 people (25%) have a reduction in pain by half or more.	50 in every 100 people (50%) have a reduction in pain by half or more.	20 in every 100 people (20%) have a reduction in pain by half or more.	30 in every 100 people (30%) have a reduction in pain by half or more.

Figure 6.2: Comparing treatment options for long-term pain on Patient Info

In furthering this discussion, I now turn to one of the 'paragon' sites of the 'Delimited and Objective ToC' modality, Virgin Media. Virgin Media is a *commercial* website. It is interesting because it governs choice vis-a-vis commercial rationalities, but does so using authoritative statistical knowledge ('Delimited and Objective ToC' modality) rather than user-generated ratings ('Produsing ToC' Modality). In this way, it differs markedly from commercial ToC websites positioned in cluster two (i.e., the 'Produsing ToC' modality). The Virgin Media website is the electronic 'shop front' of Virgin Media plc, a company that provides telecommunications services in the UK (i.e., telephone, mobile, television, and broadband internet). From the perspective of ToC it is clear at the outset that the 'scale of choice' is not global—the options on offer are delimited to the Virgin Media brand. Three key processes of governing choice are observed: (1) this modality invites users to engage with what appears to be an extensive landscape of choice, despite the limited number of options on offer; (2) 'truth' about options on offer is produced through 'standardised differentiation' drawing on expert statistical knowledge and procedural reviews; and (3) knowledge production within the website is highly controlled and curated, which tightly regulates the economy of knowledge in the web space, shutting it off from dissent or counter-discourse.

Virgin Media provides a key example of what Lawrence Busch has conceptualized as 'standardised differentiation' through the marketing discipline of 'packaging' (2011, pp. 174-180). In this way,

Virgin Media exemplifies the use of marketing and packaging in combination with the first modality to provide a new means of solving a very old problem. This problem is conceptualised through the paradoxical story of Buridan's ass (Busch, p. 174). In this story, Buridan's ass is hungry and equally distant between two piles of hay. It cannot decide which bale of hay to eat, and it ends up dying of starvation. In the contemporary context the consumer is faced with a choice between products A, B, C ... n, all of which are seemingly identical, but the consumer does not want to be 'caught out' and become locked into a bad contract or service. This calls to attention the problems with choice identified in Chapter Two (e.g., choice overload, inability to make a choice; see Section 2.1.2). ToC sites such as Virgin Media solve the problem of Buridan's ass by differentiating statistically among standardised products. There is little difference between the telecommunications services offered by different companies and it is a highly competitive market, so marketing is used to resolve the problem of Buridan's ass by presenting one package out of many as the most ideal choice for a given individual. ToC functionality are intricately enrolled in this process, which governs choice through standardised differentiation based on expert statistical knowledge.

In other words, packaging enables 'Delimited and Objective ToC' websites (in this case Virgin Media) to define their products through standardised differentiation based on expert statistical knowledge: for example, this broadband package is, among other features, "the fastest" in the UK. This is a truth statement about the broadband package, indicating that it is an ideal choice for the user. Unlike Buridan's ass, the user no longer has to remain in a state of indecision - the ideal choice is available right here through the website. It is worth reiterating that the use of standards to differentiate between objects is not necessarily a new phenomenon, as discussed in Chapter Two (Section 2.5.2). Yet, Busch argues that "until recently, neither the social organization nor the technical means existed to differentiate other than slowly over time" (p. 151). Lampland and Star resound this idea, noting that "standardization is not exclusive to modernity per se, but it has accelerated with its electronic and global forms" (2009, p. 10).

To illustrate this discussion, consider the homepage of Virgin Media. It presents the user with a large banner showing the 'deals and specials' that are currently available—users are incited to compare options within four standard types of services (Broadband, TV, Mobile & Sim, and Phone) via the main menu or by clicking on a large icon set positioned in the center of the homepage (Figure 6.3).

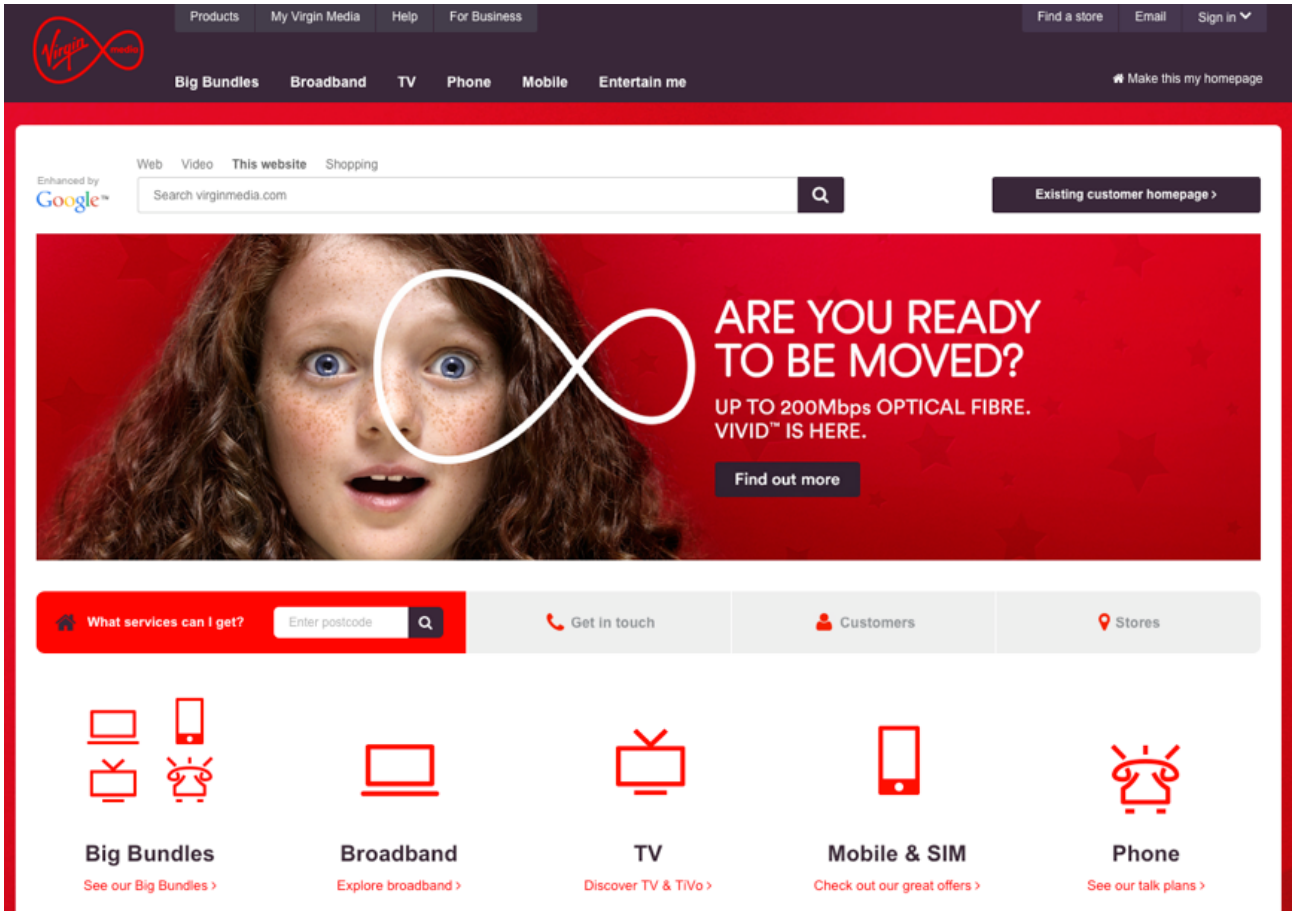


Figure 6.3: The homepage of virginmedia.com

There are no ‘sortable lists’ available to assist with sorting through the options on offer. This contrasts with the ‘Produsing ToC’ modality whereby sortable lists are almost pervasive. In short, there are not many options to compare between (in this case, to *sort*), because the scale of choice is ‘brand’ rather than ‘global’. When the user clicks ‘compare broadband’ from the main menu, they are presented with a static list of options with images and textual descriptions curated by the website operators (Figure 6.4). These services are compared statistically to other providers in the broader ‘population’ of broadband service providers in the UK (e.g., “5x faster than regular broadband”). In this way, standardised differentiation is argued to be a key mechanism that governs choice through ToC. Indeed, the ‘fine print’ (hidden in a drop-down section at the bottom of the page) indicates that these ‘statistics vis-à-vis population’ are sourced from an external authority, in this case Ofcom, an independent regulator and competition authority for the UK communications industries[2].

[2]See ofcom.org.uk

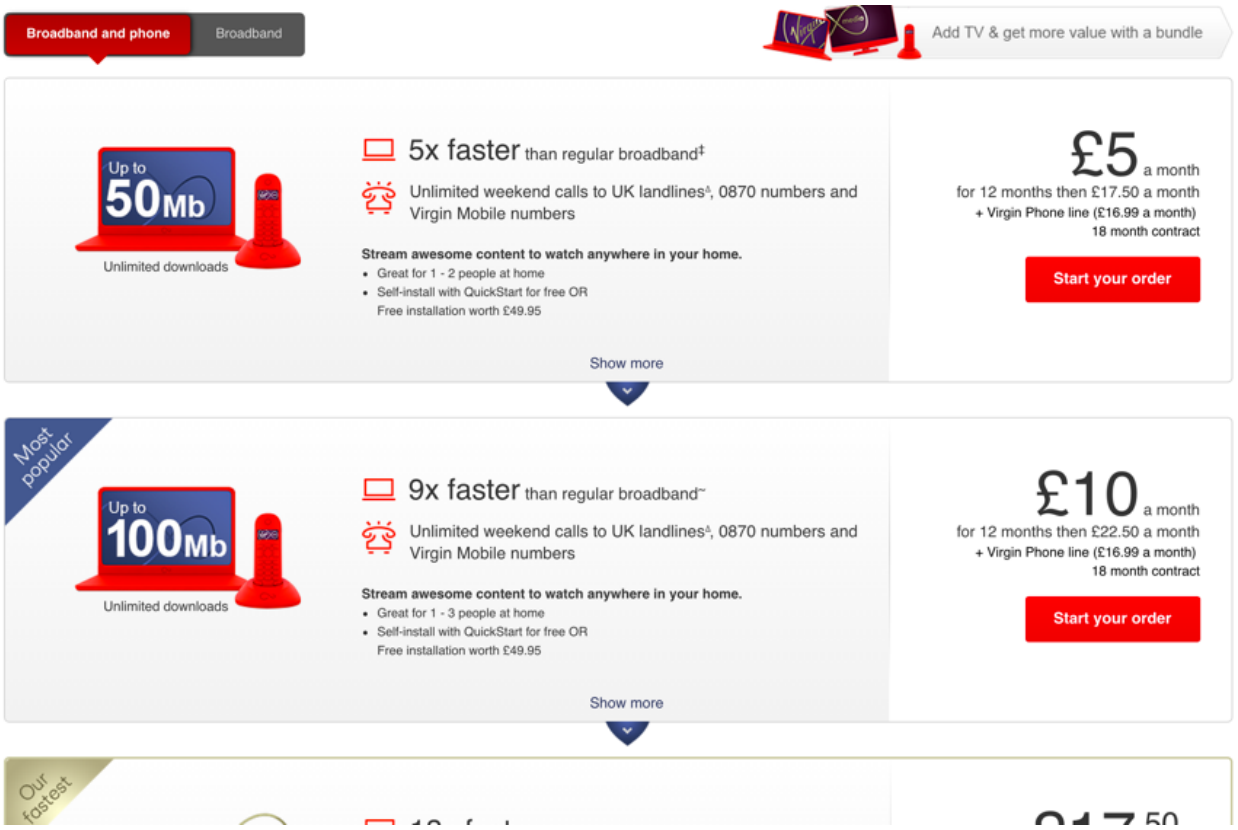


Figure 6.4: Non-sortable list of options to compare on virginmedia.com

Therefore, just like *Patient.info*, the website appeals to an external and 'independent' authority in order to legitimate or establish the veracity of their knowledge claims about the options on offer (i.e., it is 'true' that their broadband services are faster than other broadband services). Knowledge about the options on offer is presented as neutral and objective, perhaps even scientific, and this is constitutive of the 'game of truth' that the user is configured within. More importantly, we can consider this use of expert statistics as a key aspect of the 'packaging' of the services on offer through standardised differentiation in the 'Delimited and Objective ToC' modality. This illustrates the networked character of goods and services in the online world — "the ideal product only exists effectively across a network that defines it" (Busch, 2007, p. 177). As Busch writes, "there is no way we can get to 'the things themselves"', and this is particularly salient in respect to goods and services compared online using ToC. In this way commercial sites in the first modality tend to use highly curated, standardised statistics (through independent regulators or scientifically legitimised organisations) in order to differentiate their packages from other companies. ToC are strategically enrolled in this process of standardised differentiation. ToC facilitate website operators to 'package up' their goods and services by presenting favourable standardised statistics, and at the same time enable consumers to use this information to

compare between services that might be otherwise essentially identical.

6.3.2 Truth through experience: the 'Produsing ToC' modality

In contrast to the form of empiricism exemplified by the emblematic sites of the 'Delimited and Objective ToC' modality, the 'Produsing ToC' modality reflects a different form of empiricism based in *user experience*. The idea that subjective experience can be translated into valid knowledge through Internet technologies has been conceptualised recently in terms of 'crowd sourcing' (Hammon and Hippner, 2012) or 'the wisdom of the crowd' (Surowiecki, 2004), and operationalised from the perspective of the user as 'produsage' (Bruns, 2008a; Bruns, 2008b). Indeed, the 'Produsing ToC' modality produces truth through "a different kind of expertise based in experience" (Rose, 1999a, p. 281). The notion of 'experience' (Lemke, 2011; Ziewitz, 2013, Chapter 4; Feenberg, 2010, Chapter 9) emerges as crucial to making sense of how the affordances of the 'Produsing ToC' modality produce 'true' statements and systems of knowledge within the space that choice is exercised. In this section, I will illustrate the discussion using the well-known example of amazon.com, which is one of the 'ideal' sites from the 'Produsing ToC' modality (Cluster 2).

Amazon is one of the largest online retailers in the world and offers not only books, but a diverse selection of goods and services at a global scale. One of the defining characteristics of Amazon is its nominal rating ('5 star') and review system. Figure 6.5) shows a nominal rating for the book *For Whom the Bell Tolls* by Ernest Hemingway.

Figure 6.5: nominal rating on amazon.com

As 'Types of Knowledge' in the ToC conceptual framework, it is evident that both 'nominal ratings' and 'reviews' are strongly associated with the second modality. The affordances of both reviews and nominal ratings are heavily skewed towards 'produsage' processes (Bruns & Schmidt, 2011). As discussed in the previous chapter, nominal ratings have 'Users only' as a source of knowledge about

77% of the time (Table 5.12). In other words, most of the time when these ToC are deployed they depend solely on user-generated knowledge, that is, regular users who provide their own experiences and opinions about the options on offer, rather than experts or external authorities. The affordances of the 'Produsing ToC' modality for governing choice is exemplified through Amazon: (1) nominal ratings are a longstanding technology in consumer culture and therefore already have a certain legitimacy of knowledge production; (2) the user-generated knowledge from these functionalities can be regulated algorithmically in order to produce a 'true' discourse in the absence of authoritative or expert knowledges; (3) such ToC are cost effective because the website operators do not have to produce content themselves, and can rely upon the 'digital labour' of the user-base (Scholz, 2013; Fuchs, 2015); and (4) such ToC are powerful because by the rule of this 'game of truth' there is almost always a 'best' choice on offer: the ratings provides a technique of standardised differentiation that is constituted as a truth statement (e.g., the '2 stars' option is *truly better* than the '1 star' option; the '5 stars' option is *truly better* than the '4 stars' option). In this way, Amazon governs a large-scale, user-generated economy of knowledge that forms the landscape of choice. Its rating and review system, interpreted in this study in terms of ToC, effects a hierarchical structure of the options on offer (i.e., good/best choice versus a bad/poor choice). Drawing on Amazon as an exemplar of the 'Produsing ToC' modality, we observe that ratings and reviews are a key aspect of the second modality to govern choice, and, more specifically, knowledge about the options on offer within the web space.

Clearly there is a fundamental challenge for the 'Produsing ToC' modality in establishing user-generated content as truthful or 'objective' in the absence of (or sometimes alongside) external authorities and experts. Similarly, this modality is not easily made sense of in terms of Blank's notion of connoisseurial reviews that "depend on the ability of the person-a reviewer-who, because of unusual talents, extensive experience, or special training, has developed a refined sensitivity with respect to a certain product genre" (2007, p. 29). Strictly speaking, regular users are not in this sense 'connoisseurs', and this contributes to the challenge of establishing the veracity or legitimacy of the knowledge produced. If the knowledge is not legitimate or cannot be trusted, then the websites will not be used, which is not the case, as the success of 'Produsing ToC' modality websites such as Amazon and Yelp suggest. Yet what does 'truth' mean in this context? As discussed earlier in this section, I adopt a Foucaultian perspective of truth as "a system of ordered procedures for the

production, regulation, distribution, circulation and operation of statements" (Foucault, 1980, p. 193). These procedures are designed to capture certain types of knowledge and truth. Moreover, the notion of the statement emerges as key. Foucault does not define statements in terms of a popular or lexical understanding of the word, for example, making a clear or concise expression about something. Instead, he thinks about statements as a kind of *function*. In this sense, a statement is "not in itself a unit, but a function that cuts across a domain of structures and possible unities, and which reveals them, with concrete contents, in time and space" (Foucault, 1972, p. 87).

A nominal rating, interpreted in this study as a ToC feature, is a kind of statement with 'concrete contents' (a particular value such as 1 or 5) that *functions to produce knowledge about the options on offer*. For example, a '5 star' rating for a book on Amazon serves to make a truth statement that this book is a 'good' choice. The rating classifies things (e.g., books) into categories (e.g., '1 star', '5 star'), producing knowledge (e.g., "this is a bad/average/good book"). However, although the rating valorises the experience of the user as their 'truth', it does not *necessarily or automatically* produce legitimate knowledge about the book. For example, if only one user has reviewed the book, it could be possible that they are biased or untrustworthy (e.g., a 'bogus' rating, such as the author of a book reviewing their own book), and that the book deserves a '1 star' rating. User reviews are not positioned in the same way as 'connoisseurial' reviews (Blank, 2007) because users are not presupposed, or constructed, to have particular expertise or skills relevant to the context. This problem of true or legitimate knowledge is posed therefore as a problem of governance in the website: how are ToC features strategically deployed to construct or facilitate true discourse? In other words, for the 'Produsing ToC' modality, how is user experience translated into legitimate knowledge about the options on offer? This is a core dimension of governing choice through ToC. Solving this problem involves constant work and strategic effort. Indeed, in their study of fraudulent reviews on Yelp, Luca and Zervas found that approximately 16% of reviews submitted are identified by Yelp as fake and are subsequently filtered out (2013). The Yelp administrators responded to confirm this finding, indicating around a quarter of submitted reviews are not published.

In examining these ideas further, suppose that a user wishes to purchase a book on a niche topic from Amazon. Typing "15th century England" into the search form presents the user with a list of options sorted by relevance (Figure 6.6). How does he or she decide which book to purchase from the 1,796 books on this subject to choose from? If he or she were to base their decision on the selection of three

books in Figure 6.6, he or she may be inclined to choose the option with the highest nominal rating (‘5 stars’), but upon closer inspection it appears that only one person has rated this book. The next ‘best’ option is the ‘4 star’ book, which has ratings derived from 48 people. Is the ‘4 star’ rating more legitimate because it has more people contributing to it? Can it be trusted more than the ‘5 star’ rating from one person? One person is definitely not a ‘crowd’, and therefore the ‘wisdom of the crowd’ may not apply to the 5 star rated book. Or does it? To complicate matters, the third book has no rating at all - does that make it the ‘worst’ option by default? How can a true discourse be established about which option is the ‘best’?

Figure 6.6: ‘15th century England’ books on Amazon sorted by relevance

To answer this question, nominal ratings are ubiquitous on the web and are a standard of the ‘Produsing ToC’ modality. At first glance this seems to be unproblematic, that is, ‘5 stars’ is best. However, the previous example of purchasing a book on Amazon suggests that ratings stand to be problematised from an ontological perspective. A reexamination of the ontology of nominal ratings leads to an appreciation of all the elements that are ‘folded into’ these socio-technical artefacts (Latour, 2002, p. 249). Nominal ratings are not singular entities in the production of truth through the ‘Produsing ToC’ modality. We are led to consider this modality as a feat of ‘heterogeneous

engineering', whereby the knowledges produced are "effects generated in patterned networks of diverse (not simply human) materials" (Gehl, 2014, p. 13). Indeed, for the second modality, reviews and ratings are almost always coupled together, and they would not exist if not for the human users who 'produse' them (as the book with no rating in Figure 6.6 illustrates). The '5 star' book in Figure 6.6 ('Fifteen Century England' by Percival Hunt) only has one customer rating, yet we can appeal to the review in order to get a better sense of the truth or objectivity of this singular rating (Figure 6.7). 'True' or veracious knowledge about this book is produced when it is traced or navigated through its actor network (in this example following the associations between the rating and the review). In this sense, the 'Produsing ToC' modality can be said to *translate experience into truth*. Why should we believe the subjective experience or opinion of this reviewer? The game of truth played out on Amazon positions experience as a type of knowledge about the options on offer, and the affordances of the 'Produsing ToC' modality legitimises this type of knowledge as 'true discourse'. In this modality, truth is like a fragmented mirror - it requires enough fragments to give a coherent picture of the truth - and if key pieces are taken away (e.g., ToC features), experience qua truth becomes less coherent and its privileged status as 'legitimate' knowledge can be compromised.

Figure 6.7: The 'fractional coherence' of knowledge produced through nominal ratings: the example of 'Fifteen Century England' by Percival Hunt

In furthering these ideas, the notion of 'fractional coherence' (Law, 2002, p. 2) provides one way to account for the tentative and multiple way that the 'Produsing ToC' modality governs choice. As discussed in Chapter Two, fractional coherence is "*about drawing things together without centering them*" (Law, 2004, p. 2, emphasis original). In this way, nominal ratings and reviews are arguably stable entities or 'social systems' (Blank, 2007, p. 28), but at the same time are 'fractionally coherent' because they depend upon, and are inextricably linked to, other socio-technical systems and actors. The first aspect to note in the user review in Figure 6.7 is the 'Verified purchase' tag (categorised in this study as 'User account verification'; see Section 4.5.1.4), which signifies whether a reviewer has actually purchased the good or service being reviewed. This lends credibility to the '5 star' nominal rating

for this book because it contributes 'objective' evidence that the review is not fake, by constructing a connection between the 'rating' to the 'rater'. Secondly, the text of the review in Figure 6.7 enables an assessment of the '5 star' rating against the subjective opinion of the reviewer. Once again, the review is not *in itself* singularly coherent - it gains durability and legitimacy in relation to the other actors - and is 'fractionally coherent' in its associations with these other actors. Third, in Figure 6.7 no other users have provided feedback about whether the review was helpful or not (categorised in this study as 'user-to-user evaluation', see Section 4.5.2). This stands in contrast with the 'most helpful' review for the '4 star' book in Figure 6.6 (i.e., 'The Welsh Healer: A Novel of 15th Century England'). Figure 6.8 shows that 100% of people (20 / 20) found this review helpful, and that it is also a 'verified purchase'. There is an apparent contradiction at play here: this particular reviewer bought and then rated the book as '5 star' (and 100% of other users agree), yet overall the book only has a '4 star' rating. What are we to believe?

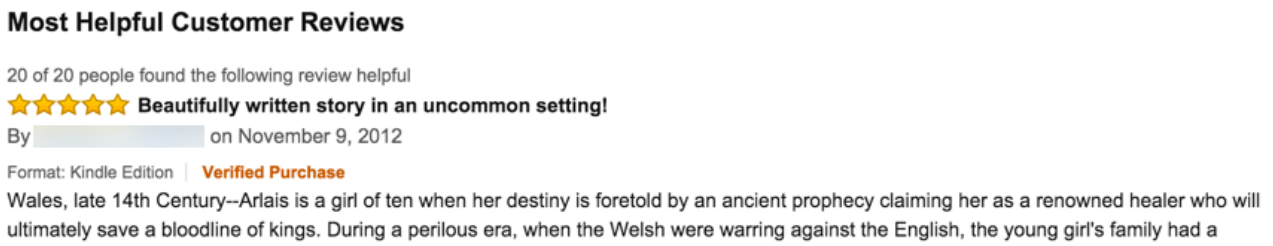


Figure 6.8: Fractional coherence of knowledge produced through the second modality

This discussion serves to highlight how the features of the 'Produsing ToC' modality connect together to construct veracity in discourse, the truth of collective experience (Lemke, 2011, p. 32). This reveals the complex, stable, and yet 'fractionally coherent' character of how ToC are deployed to govern choice in this modality. Websites in the second modality have affordances for programming and governing the landscape of choice, and depend upon not only each other, but also the agential capacities and pre-existing subjectivities of users who 'produse' the content. The standards of this modality are nominal ratings and reviews, as opposed to statistical forms of knowledge (as per the 'Delimited and Objective ToC' modality). Indeed, Lampland and Star argue that a common dimension of all standards is that they are 'nested' and "increasingly linked to and integrated with one another across many organizations, nations, and technical systems" (2009, p. 5). Interpreted as a phenomenon of standardised differentiation, ToC are a deeply embedded infrastructure of contemporary techno-social hybrid societies. Yet as I have argued this does not occur in a singular way: it obtains a "messy reality" (Lampland & Star, 2009, p. 11). This also

resonates with Ziewitz's suggestion that evaluative practices are messy and never quite finished (2012, p. 23).

We have observed how the 'Produsing ToC' modality has affordances for governing choice that operate according to an economic logic: driving users towards making a transaction, feeling satisfied, and gaining and retaining user attention on the site. Yet, these affordances are constituted through socio-technical actor-networks that include not only the interrelationships between ToC features, but also human users, systems of classification, and algorithms that curate and regulate flows of information, to name a few. The second modality governs choice in the context of these actors and the relations that can be established between them in the web space. The knowledge about the options on offer that 'Produsing ToC' websites produce is dependent upon, and distributed through, heterogeneous actor-networks. Knowledge production is not reducible simply to 'crowd-sourced' knowledge or 'produsage' processes - there is clearly much more going on to establish and maintain the 'truth' status of this form of empiricism.

The role of algorithms cannot be understated in processes of knowledge production vis-a-vis the 'Produsing ToC' modality. As Scott and Orlikowski argue in relation to TripAdvisor:

> on TripAdvisor the algorithm is pervasive but its origins and locus ambiguous, thus illustrating that the power of ranking is its capacity to present itself as objective fact, to reflect the truth (Scott & Orlikowski, 2012, p. 39).

This resonates with Beer's argument that algorithms have a power to impact on social and individual realities via the affordances and architectures of Web 2.0 (2009). However, this is not to 'explain away' the role of algorithms in governing knowledge production through ToC, but as Ziewitz argues, "to attend to how the *figure* of the algorithm is employed and comes to matter in specific situations" (2016, p. 10). For the 'Produsing ToC' modality, it is clear that the 'wisdom of the crowd' (Surowiecki, 2004) does not emerge without intervention, but instead through the algorithmic curation and regulation of flows of user-generated information in an effort to promote and encourage true discourse, and mitigate false or 'unaccountable' knowledge (Scott & Orlikowski, 2012). Bucher frames this in terms of 'authenticity', which he argues is an under-appreciated infrastructural element of Web 2.0 (Bucher, 2012). Thus, in this modality, 'authentic' discourse within ToC websites is not

something that simply emerges naturally from the crowd, but rather it is produced, calculated, curated, and governed. Ratings and reviews are deployed in service of a user-generated empiricism that is highly governed in order to maintain its legitimacy and status as 'objective' knowledge.

6.3.3 Epistemological tensions: 'hybrid' modalities of ToC

In this section I have discussed how ToC govern choice through two different epistemologies, constitutive of the two ToC modalities. However, knowledge production can also occur through a kind of 'hybrid' epistemology that deploys ToC features from both modalities. Indeed, 17.5% of sites in the study sample produced knowledge using a combination of 'users' and 'websites operators / experts' (see Chapter Five, Table 5.12). What does it mean for a given website to govern choice through a hybrid epistemology that simultaneously deploys features from *both* modalities of ToC? In this section I address this question using an illustrative case study of the UK government NHS Choices website (nhs.uk). This website is interesting for two main reasons. First, it is located approximately in the 'middle' between the two clusters (see Section 5.3.5). This means that it is not clearly the 'Delimited and Objective ToC' modality or the 'Produsing ToC' modality, but deploys ToC from both of these modalities, rendering its position in the cluster analysis towards the center area where the two clusters converge (Figure 5.1). Second, little is known about state-operated ToC in the context of public services. These sites represent a particular point of interest of this study. Whilst only two government ToC websites were observed in the top-ranking sites in the study sample, NHS Choices appeared *twice* in the study sample[3].

In Chapter Two it was established that 'choice' has become a compelling policy principle in many countries, including the UK (Newman & Kuhlmann, 2007; 6, 2003; Taylor-Gooby, 1998), and that ToC may be on an entangled trajectory with government and politics. NHS Choices is an important part of the electronic government (e-Government) strategy for choice-infused health policy in the UK. From the outset, the website name and logo (Figure 6.9) strongly suggest the role that the site has to play in governance. NHS Choices was launched in 2007 and is the official website of the National Health Service in England, boasting over 48 million visitors per month and is the UK's biggest health website (NHS Choices, 2015). A key aspect of the website is the Service Search, which the website

[3]NHS Choices appeared as top-ranking site in both the 'UK' and the 'Health' categories. The other government ToC website was tfl.gov.uk.

states "let[s] you find, choose and compare health, support and social care services in England. We also publish reviews and ratings across health and social care services" (NHS Choices, 2015).

Figure 6.9: Discourse around choice: the NHS Choices logo and subtitle

The 'Services near you' section of NHS Choices constitutes the ToC aspect of the website. The stated aim is to enable NHS users to compare between health and social care services in their area, in order to make the 'right' choices. Searching for "GPs" in "London" (Greater London, EC3M) returns 2096 results, and a sample of the results is provided in Figure 6.10. As Figure 6.10 shows, both modalities of ToC are observed to operate simultaneously. In particular, user-generated nominal ratings ('NHS Choices users rating') represent a key element of the 'Produsing ToC' modality. On the other hand, the 'Delimited and Objective Choice' modality is represented by a range of statistical data provided through a survey conducted by an independent authority[4]. Users are able to use the 'Topics' drop down box to compare services using a range of statistical characteristics of commensurability, such as 'Patient experience' (Figure 6.11). Broadly speaking, the manner in which NHS Choices governs choice is not easily characterised as one modality or another, but instead is constitutive of a hybrid approach.

[4]The survey is conducted by Ipsos MORI on behalf of NHS England (GP Patient, 2015)

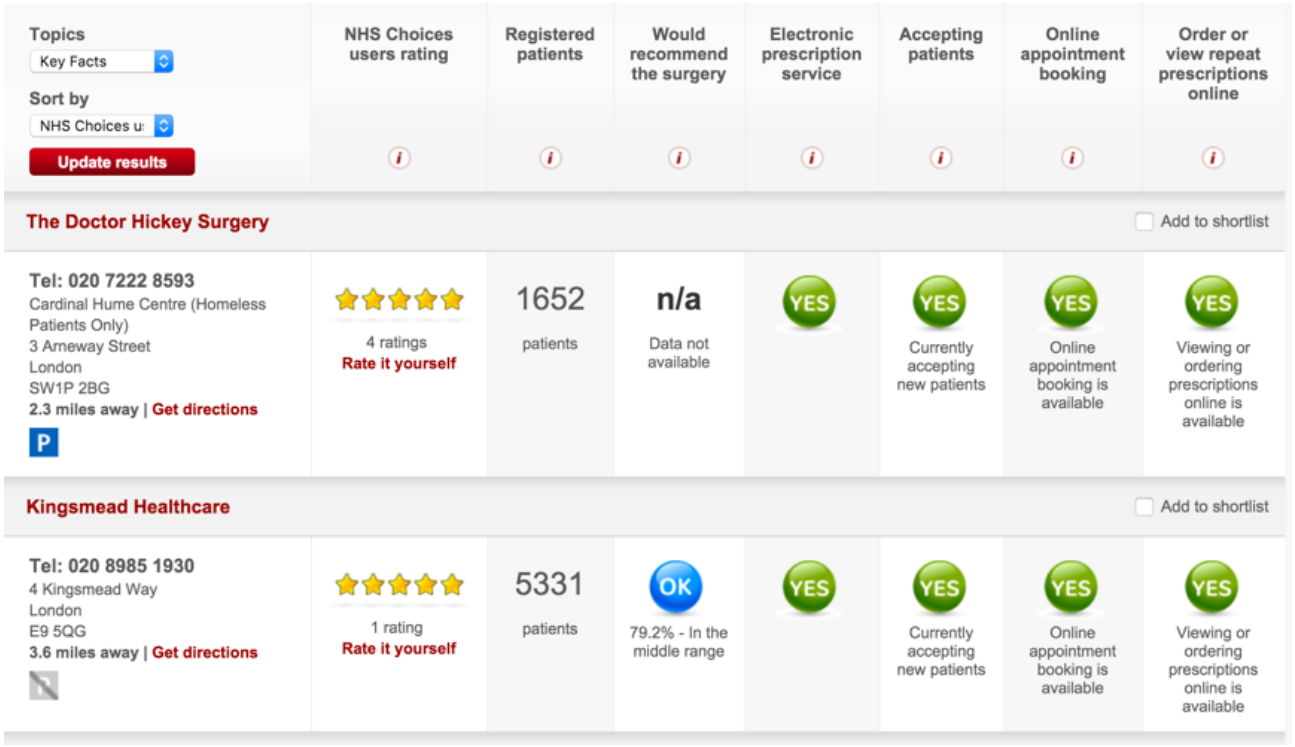


Figure 6.10: NHS Choices: comparing the highest rated GP services in London (the 'Produsing ToC' modality)

At first glance, the affordances of nominal ratings for NHS Choices appear similar to 'Produsing ToC' websites such as Amazon or Yelp. That is, the ratings and reviews enable users to not only compare between services, but also express their opinions by evaluating the options on offer (Ziewitz, 2012), or in another sense, to critique from experience (Lemke, 2011). Considered as a socio-technical actor that is productive of 'truth', potentially shaping choices about serious matters of health and well-being for residents of the UK, we may wonder what the rating actually evaluates. Like many ToC websites in the 'Produsing ToC' modality, it may appear to rate each service as a whole, that is, overall satisfaction, or provide some average of ratings for different characteristics or features. However, the rating has a well-defined meaning in relation to a specific question, and also only within a time-frame of two years (older ratings are not factored into the calculation)[5]

> Overall rating score is based only on ratings for the question "How likely are you to recommend this service to friends and family if they needed similar care or treatment?". It is an average of all the ratings awarded for that question in the past two years. While you can still view older ratings, they are not used in the overall rating calculation.

[5]This information is available by clicking on the information icon next to the ratings for each service on nhs.uk

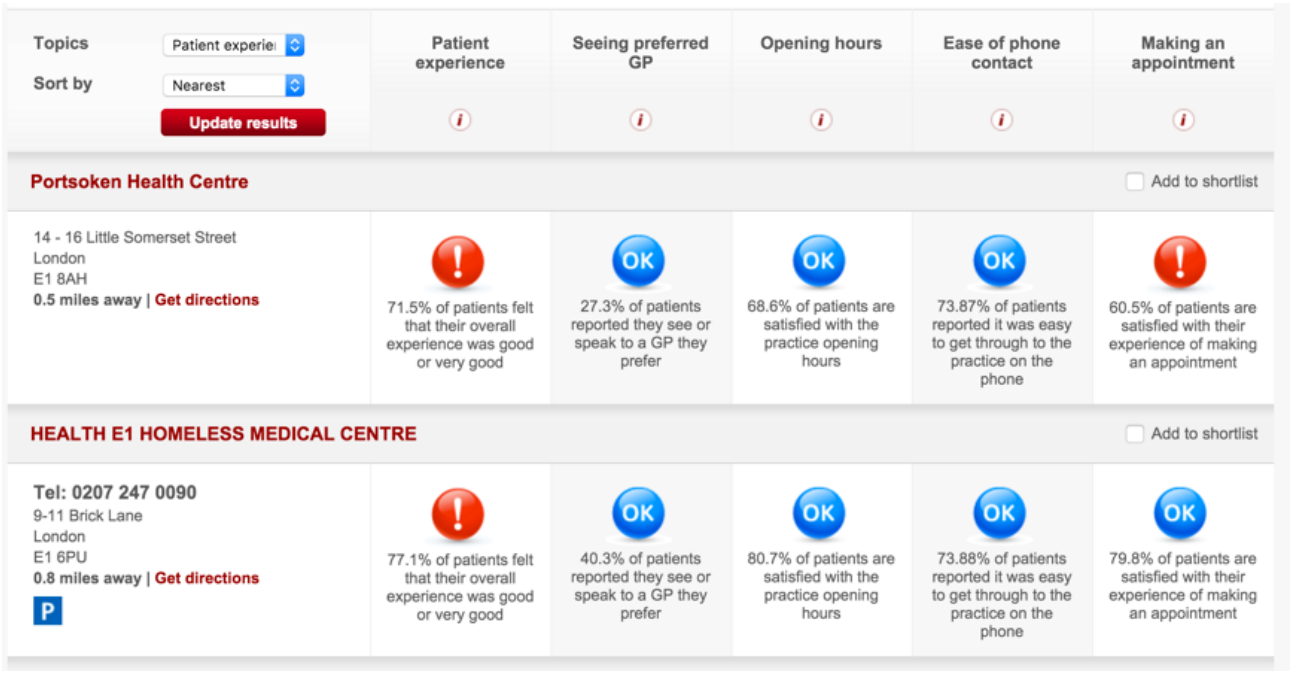


Figure 6.11: NHS Choices: comparing statistical data on 'patient experience' for GP services nearest to London (the 'Delimited and Objective ToC' modality)

In this way, the website configures the user by asserting a 'correct reading' of the rating (Woolgar, 1991), in a manner that is somewhat analogous to technical user manuals. Nominal ratings are therefore deployed, but require intervention by the website operators in order to ensure users are using them in the 'correct' manner. As discussed in Chapter Two (see Section 2.2.2), this also provides an example of how ToC can be 'affordized' (Pollock, 2012) in order to realise their affordances. The nominal ratings deployed by the NHS Choice website must be 'affordized' to suit the particular domain in which they are embedded (public services in the UK). Unlike amazon.com, which has no 'timeout' period for ratings, NHS Choices has a timeout period of *two years*. Why might this be the case and how can we make sense of it? Clearly, NHS Choices has a key role to play in governance of public services through non-price based competition between service providers. If older ratings are not 'erased' from the overall average, there is no incentive for service providers to change and improve themselves in response to public evaluation (i.e., users submitting poor ratings) within a competitive funding environment. Like the number of 'dots' on the 'magic quadrant' device in Pollock's study, the rating device on NHS Choices needs to be affordized to not only capture, but also *intervene*, in a dynamic quasi-market of public health and social care services in the UK (Pollock, 2012; see also Section 2.2.2).

Developing this further, we can make sense of it as a form of 'memory practice' (Bowker, 2005).

Bowker defines memory practices as a range of practices (technical, formal, social) that commit knowledge to record, and in doing so "allow (to some extent) useful / interesting descriptions of the past to be carried forward into the future" (2007, p. 25). In this way, the nominal rating on NHS Choices acts as an 'archive' that holds knowledge about each service organisation, providing (in the present) a characteristic of commensurability for ranking and comparing the organisations through the site. Importantly, the rating qua archive provides a technically-mediated 'memory' of the performance of each organisation (as rated by users), but it is a *temporally-constrained memory* that systematically forgets knowledge recorded more than two years into the past. Thus, at first glance the rating appears to function similarly to other 'Produsing ToC' websites, such as amazon.com, but a closer examination reveals how NHS Choices 'affordizes' the rating in order to "forget things selectively about the past in the process of producing knowledge" (Bowker, 1997, p. 114).

Bowker's concept of 'erasure' provides further understanding about this specific form of memory practice. Erasure is defined as "the constant filtering out of information deemed not worthy of preserving for [an] organization's future purposes" (Bowker, 1997, p. 123). For NHS Choices, ratings that were submitted more than years in the past are systematically 'erased' from the overall average rating for each individual service organisation available for comparison through the site. This does not entail 'total' erasure, because the older ratings are still available to view within the individual profile page of each service organisation. Rather, the ratings are filtered out from the overall average rating, and therefore filtered out from the 'official' knowledge of each organisation produced (in the present moment) through the ratings device (e.g., Kingsmead Healthcare *is currently* a '3 star' organisation). In a way, this process resonates with Neyland's notion of 'algorithmic deletion', whereby the presence or absence of data within a given system is regulated algorithmically (2015, p. 127). In this case, user-submitted ratings older than two years are not completely deleted from the system (they are still visible on the profile page for each service organisation), but they are automatically rendered 'absent' from the overall average rating for each service organisation.

This practice of erasure or deletion makes more sense when it is considered in light of the 'hybrid' ToC modality of NHS Choices and the broader 'memory regime' in which the website functions (Bowker, 2005, p. 9). As previously mentioned, service organisations on NHS Choices can also be compared and ranked based on various statistical constructs derived from an independent survey,

which in turn accords with the 'Delimited and Objective Choice' ToC modality. Similar to the ratings, these statistics produce knowledge about each service organisation (e.g., comparing organisations based on the 'Patient experience' statistic; see Figure 6.10). A key aspect is that the surveys are conducted regularly, including monthly[6], quarterly[7], and bi-annually[8]. These routine surveys are strategic for the NHS because they enable the organisation to maintain an up-to-date account of how each organisation is performing. However, it follows that the knowledge produced through these surveys may quickly become *asynchronous* with the overall average rating for each service organisation. Therefore, the strategy for addressing this problem is to subject the ratings to procedures of erasure that seek to constrain them temporally to two-year windows, in other words, keep the ratings 'fresh' and up-to-date. This provokes an interesting line of inquiry regarding ToC and the state, including the role of ToC in contemporary neoliberal or 'advanced liberal' modes of government that govern through rationalities of accountability, competition, and efficiency. However, this discussion is beyond the scope of this study and will not be addressed further here (for a brief discussion see Section 7.5.2).

These observations serve to illustrate epistemological complexities, tensions and contradictions on the NHS Choices website, which bring to light a peculiar kind of 'game of truth' pertaining to this hybrid modality of governing choice. Indeed, the profile page for Kingsmead Healthcare shows (Figure 6.12), NHS Choices deploys 'ratings for different characteristics or features' (see Section 4.4.1.2), yet the 'overall' rating does not take these ratings into consideration, and it not entirely clear why. In this way, the 'overall' rating reflects the extent to which users would recommend the service. However, as Figure 6.10 previously demonstrated, the statistical characteristic of commensurability 'Would recommend the surgery' measures a very similar concept, but does so in line with the 'Delimited and Objective ToC' modality. Thus, there are two modalities of ToC operating simultaneously to measure the same concept, using fundamentally different forms of empiricism. In this particular example, the observed values appear to be sometimes at odds with one another - the 'truth' about the options on offer is open to contestation within the space.

In problematising the mode of knowledge production for NHS Choices, there are often discrepancies between the user rating (representative of the 'Produsing ToC' modality) and the 'Would recommend

[6]See http://www.nhs.uk/scorecard/Pages/IndicatorFacts.aspx?MetricId=6212&OrgType=GP
[7]See http://www.nhs.uk/scorecard/Pages/IndicatorFacts.aspx?MetricId=10060&OrgType=GP
[8]See http://www.nhs.uk/scorecard/Pages/IndicatorFacts.aspx?MetricId=12095&OrgType=GP

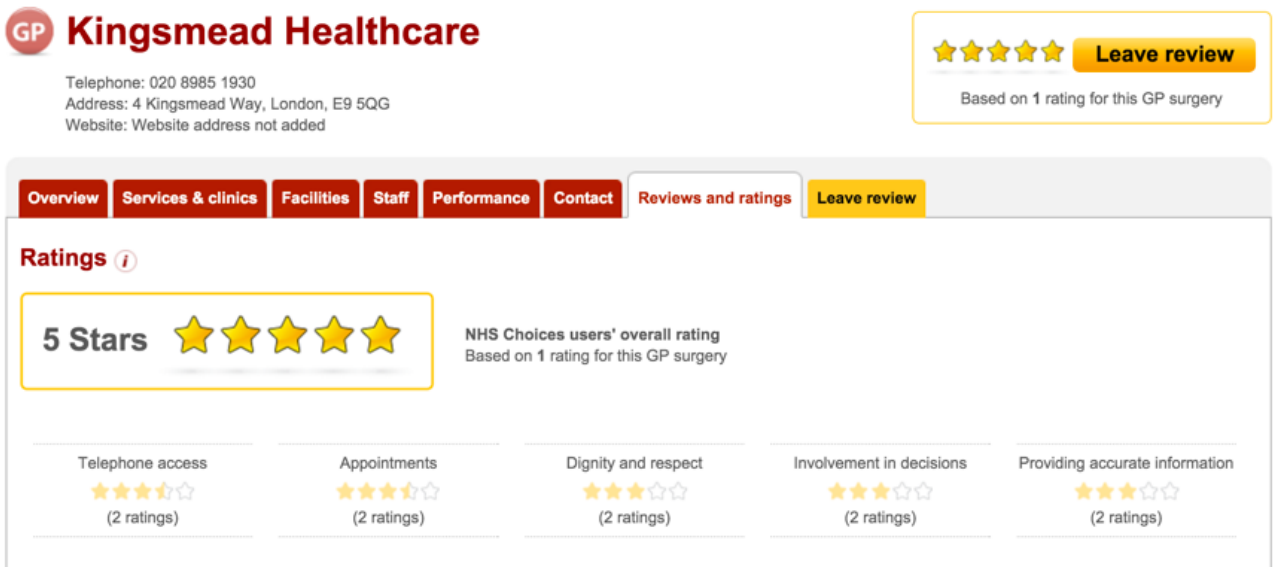


Figure 6.12: NHS Choices: ratings for different characteristics or features

the surgery' statistical construct (representative of the 'Delimited and Objective ToC' modality). For example, Figure 6.13 shows a sample of *nominal ratings* for GPs in London, which all share a '2.5 star' value for the overall rating (i.e., how likely users are to recommender this service to friends and family). However, the *statistical construct* 'Would recommend the surgery' tells a different story. Therefore, even though each of these services has the same value of rating (2.5 stars), statistically they range from 'Among the worst' to 'Among the best'. Clearly there are tensions that can arise from the intersection or collision of the different ToC epistemologies. Each modality produces truth claims about the options on offer, and these truths may, or may not, coincide with one another. However, the aim of this discussion is not to determine the validity or reliability of information on NHS Choices, but to highlight the tensions and contradictions between two modalities of governing choice that are based on different forms of empiricism. These tensions matter because, in this instance, NHS Choices produces truth statements about the organisations providing health and social care services. These choices are not trivial to individuals - perhaps in some cases they may mean the difference between wellbeing and illness, or even life and death. At the same time, as discussed previously, the website operators manage epistemological tensions, at least partly, through 'memory practices' and 'erasure' (Bowker, 1997; Bowker, 2005) and by configuring users to use particular ToC features in the 'correct' manner (Woolgar, 1991). In a sense, this predefines the affordances of the ratings, or 'affordizes' them (Pollock, 2012), without determining or controlling their use or interpretation. In turn, it has a shaping effect on choice and the knowledge produced through 'hybrid' modality ToC websites.

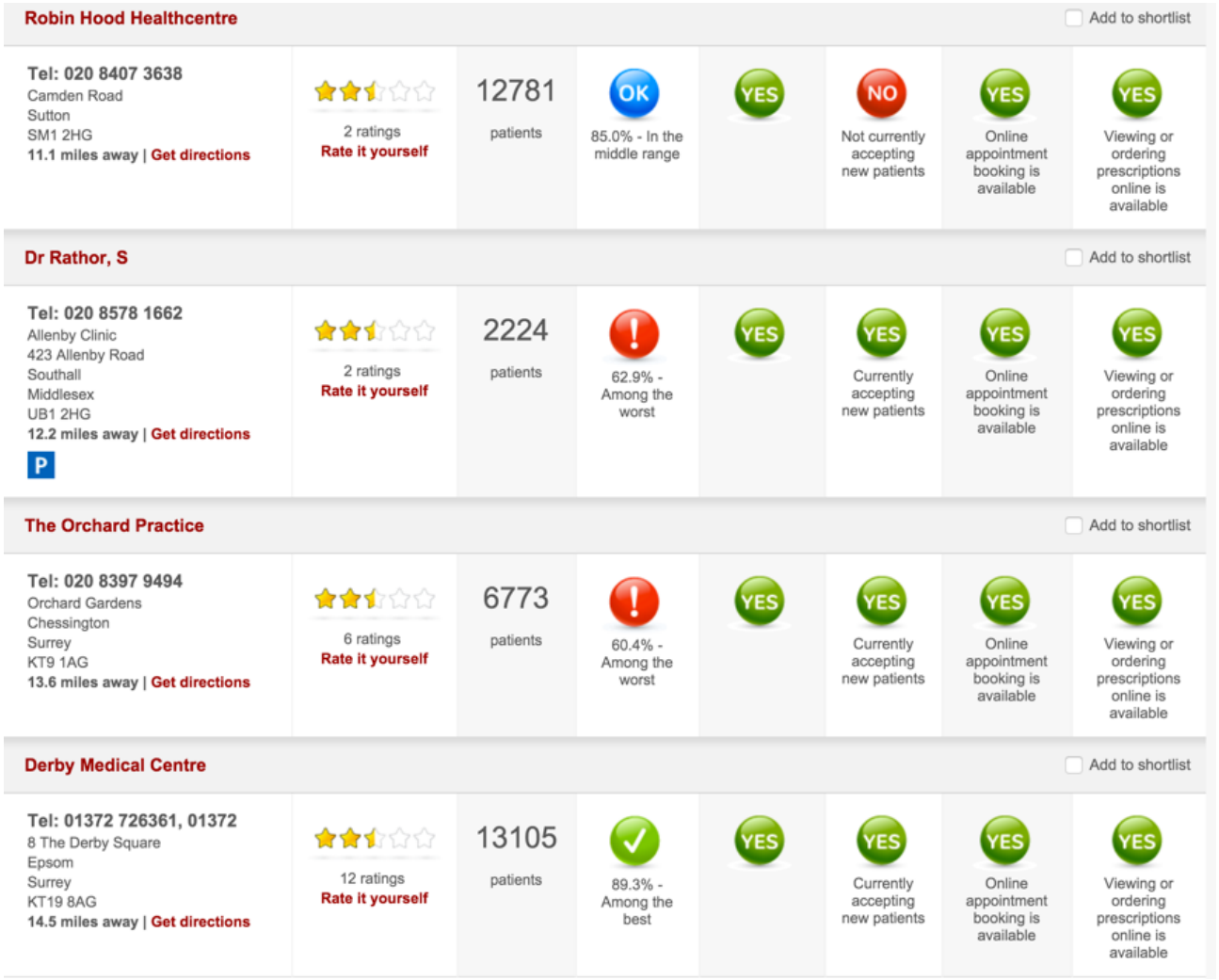


Figure 6.13: Fractionally coherent empiricism: discrepancies between user ratings and statistical data on the NHS Choices website

The question posed at the beginning of this section asked what it means for a ToC website to govern choice using a hybrid epistemology. The discussion suggests two answers. Firstly, a hybrid epistemology results in a web space where choice, and more specifically the truth claims about the options that are compared, is open to contestation and struggle. There may be differing degrees of consensus about what is a 'good' versus 'bad' choice. Using the NHS Choices websites as an illustrative case study, this highlights, or perhaps affirms, the role of ToC in evaluation as governance (Ziewitz, 2012). Hence, by deploying ToC features from the 'Produsing ToC' modality, the NHS Choices website affords users the opportunity to evaluate (Ziewitz, 2012) or critique (Lemke, 2011) the other forms of knowledge presented through the 'Delimited and Objective ToC' epistemology (i.e., expert statistics). Secondly, a hybrid epistemology means that website operators

may need to configure users in order to 'correctly' interpret how to compare the options on offer, given that there are multiple knowledges presented to the user (e.g., users have rated this hospital as mediocre (average of 2.5 stars), but the statistics say it is "among the best" in the UK). In the example of NHS Choices, this is achieved through memory practices (Bowker, 2005; Bowker, 2007) and, more specifically, procedures of 'erasure' (Bowker, 1997) that perform time limits on user-submitted ratings (i.e., they are no longer calculated into the overall 'average' rating after a two-year period). In this sense, work is required in order to 'affordize' the ToC features to suit the purposes of the website operators.

6.4 Individualisation and Subjectivity of ToC

In this section I discuss how the modalities of ToC govern through individuality, contributing to the construction and governance of choice and 'choosers'. In the 'Delimited and Objective ToC' modality, processes of individualisation tends to be relatively absent compared to the 'Produsing ToC'. As a result, I will focus the discussion on the 'Produsing ToC' modality, and attend to the 'Delimited and Objective ToC' modality towards the end of this section.

6.4.1 Profiles, categories, and targeting: individualisation through 'Produsing ToC'

It is evident that 'Produsing ToC' websites often *drive users* towards participating as individuals in networked publics that assemble within the space. For example, Yelp[9], which is an 'ideal' site for this modality, constantly presents users with opportunities to 'produse' content, for example by uploading photos and videos of visits to restaurants as part of their reviews. At the same time, users are presented with 'offer[s] of subjectivation' (Latour, 2005, p. 213) that simultaneously individualise them and also produce knowledge about the options on offer. For example, Figure 6.14 shows how each photo uploaded by 'Jane D.'[10] has a 'like' button (i.e., unary rating), enabling other users to not only evaluate

[9]Yelp.com is a website that enables users to compare between and rate/review local businesses and places such as restaurants, dentists, and parks.

[10]User has been de-identified using a pseudonym.

Jane D's content, but also express themselves as someone who 'likes' the food and beverages from the restaurant that is under evaluation (i.e., 'Coffee Anthology').

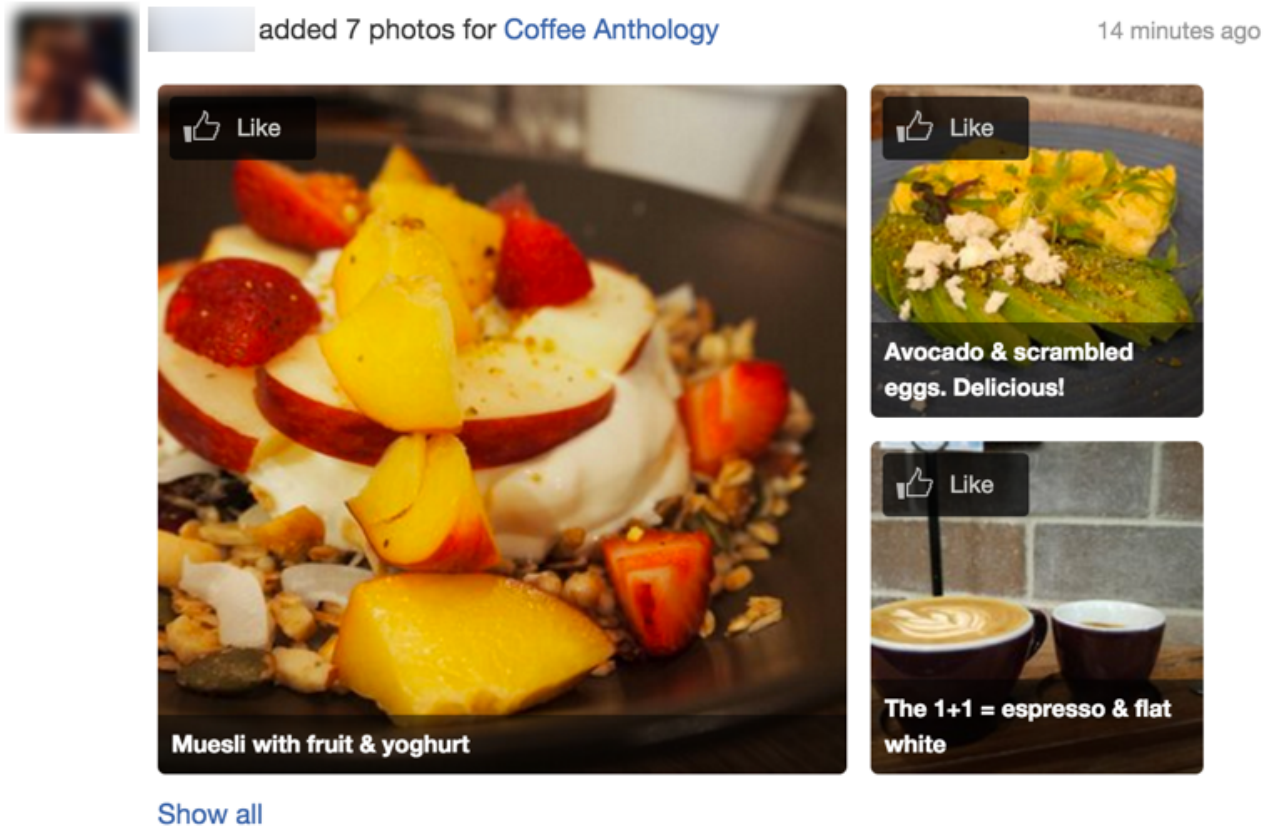


Figure 6.14: Offers of subjectivation through user-generated media on Yelp

In the 'Produsing ToC' modality, users can be subjected to a logic of performance measurement that provides numeric levels of their contribution to the site (e.g., "Level 3 Contributor"), which is attributed to, and makes up, their individual profile. For the second modality, such processes have a structuring effect on the networked publics that convene in the landscape of choice, configuring users towards a logic of competition and self-advancement that is expressed through their individuality. Figure 6.15 exemplifies the subjectification of users qua individuals on tripadvisor.co.uk, quantifying and measuring their activity or 'contribution' to the site through a logic of performance measurement. Here we observe that activity conducted within the web space is tied to self through the individualising effects of the profile (e.g., 'Jill Smith'[11] *is a* Level 5 Contributor), and becomes meaningful in the context of the broad 'networked public' composed of individuals.

[11] User has been de-identified using a pseudonym.

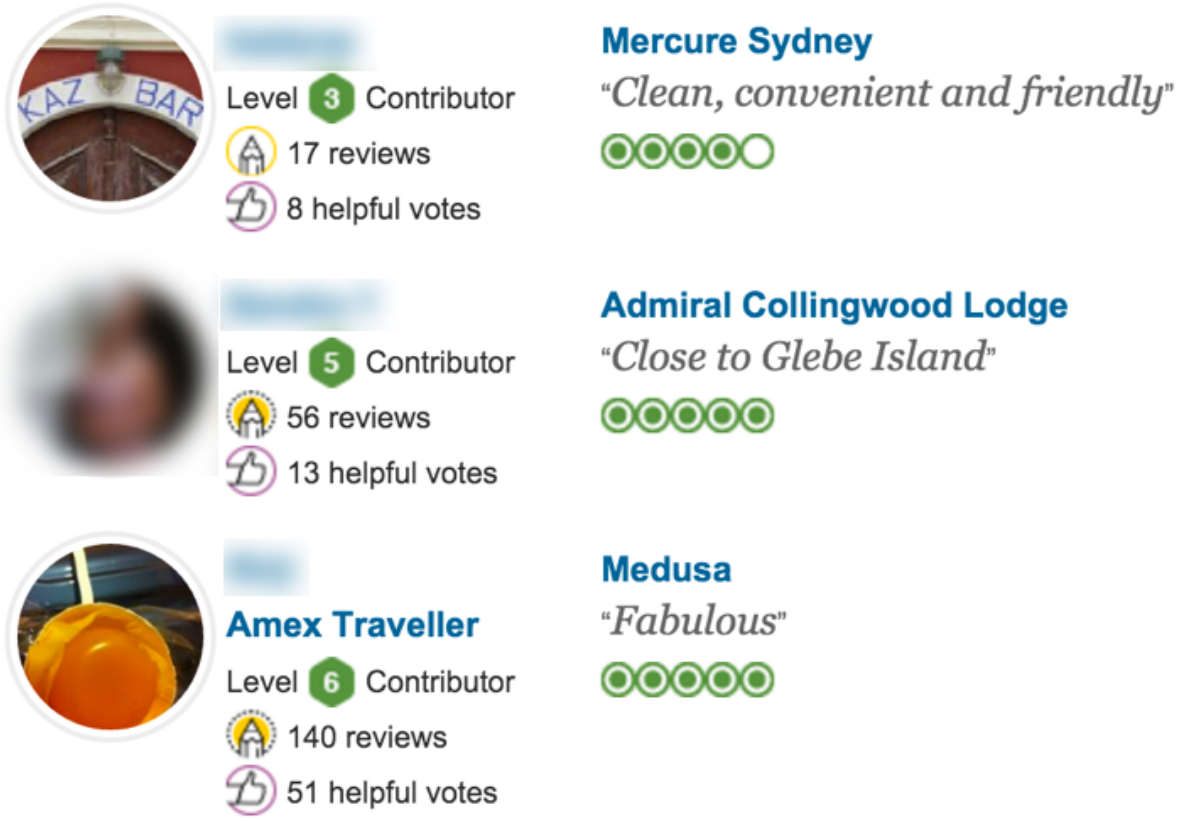


Figure 6.15: Individualisation and subjectification of users through performance measurement

ToC websites in the 'Produsing ToC' modality such as peopleperhour.com extend these processes of individualisation because they are not only applied to 'buyers' but also to 'sellers' who provide the goods and services. In order to ensure that sellers are trustworthy and dependable, a range of ToC features are applied to sellers that the sellers are then constructed and individualised (and subsequently categorised and ranked) in relation to. For example, in Figure 6.16 we observe a popular logo designer named "John D."[12] who has literally 'plastered' his profile page with examples that define him *categorically* in terms of the quality, nature, and dependability of his services. For example, he has a 'Reputation' of '5.0 out of 5', 100% 'Job Success', and a 'Sales and marketing' rank of 159. The website operators of peopleperhour.com appear to be successful in their attempts to deploy ToC to construct and regulate a self-governing economy of 'choice' within the website, whereby users can take on the role of buyer and/or seller. Indeed, the users qua sellers of the site (in this example the seller "John D.") are able to almost completely define themselves in terms of their

[12]User has been de-identified using a pseudonym.

performance vis-à-vis ToC features, and more specifically the system of classification that is embodied and reproduced through the website.

Figure 6.16: Internalised subjectivities? Constructing sellers as individuals through ToC features

This is interesting in light of Bucher's argument that algorithms that underpin Web 2.0 may lead users to internalize the subjectivities of the website operators (2012). It may be possible that website users, through repeated use of categories over time, may come to internalise the subjectivities of the website operators. As Hearn (2010) argues, Web 2.0 practices "function to direct human meaning-making and self-identity in highly motivated and profitable ways" (abstract, 2010). In the aforementioned example, the user "John D." in his capacity as a logo designer likely has a more complex narrative and self-identity than the categories on his profile page are able to capture and express. Star and Bowker (2007) conceptualise this more broadly in terms of 'residual categories', defined as categories not formally represented within a particular system of classification. Applied to the example of "John D.", the residual categories are those that are not available or formally represented through the website, or more specifically the ToC features. Yet, the observed categories are what renders "John D." *knowable* as a potential 'best' choice for users qua buyers who are comparing logo designers through the website, and "John D." actively individualises and differentiates himself from competing sellers using these categories. This naturalises and embeds these categories, potentially to the exclusion of other possible alternate or 'residual' categories that speak to other narratives, subjectivities, and classification systems. To be sure, this is not to argue that these processes are either 'good' or 'bad', but to highlight a powerful aspect of how 'Produsing ToC' websites shape choice, and, in broader terms, the consequences of classification for knowledge production in this context (Bowker & Star, 1999).

For 'Produsing ToC' websites, individuality and subjectivity are not simply designed around, but actively designed *with*. The system of classification embedded within a given ToC website both presupposes and produces choice and 'choosers'. It facilitates markets and 'choice' to exist and flourish within the web space, driven by the self-governing capacities, actions, and individuality of users. As Introna argues, "they [users] internalize these calculating practices, and the knowledge they legitimate, to become self-governed subjects" (2016, p. 36). Individuals' subjectivities and interests link up to, and become enmeshed with, ToC. Although these processes are certainly not reducible to 'choice', it is clear that the 'Produsing ToC' modality operates with, and through, the individuality of users. ToC and subjectivities are in this sense co-constitutive, existing and transforming in a feedback loop mediated through the web space. As discussed in Chapter Two, this highlights the 'socio-materiality' of the Produsing ToC modality, whereby the social and material[13] recursively co-constitute each other (Mol, 2002; Mol, 2009). Choice, in this sense, appears to take on a 'cyborg' aspect (Haraway, 1991) because it is not clear where the machine (ToC) start and the human (users) ends. 'Produsing ToC' websites and users do not merely have complex relationships, but in differing degrees co-constitute one another (Verbeek, 2005).

Following this, a key aspect of individualisation for 'Produsing ToC' websites is the role of the user profile within the site. Websites in this modality tend to enable, or even urge, users to log into the site using existing social media profiles (see Section 4.5.2). This is exemplified on Trip Advisor (which is a 'paragon' site in this study), as Figure 6.17 shows. This stands in contrast to the 'Delimited and Objective ToC' modality, where users are configured as a sort of 'anonymous reader' and are provided with either limited user profiles or none at all.

For the 'Produsing ToC' modality, user profiles are literally embedded into the functionality of the website. For example, if a user of Trip Advisor logs in using their Facebook account and clicks 'like' on a particular hotel, they are 'liking' the hotel *as themselves*. They authorise the website to use their data, which, in the case of Facebook, often includes rich and detailed personal information, and this is redeployed within the website. In particular, Trip Advisor harnesses this individualising data in a powerful way to gain and retain user attention on the website. As Figure 6.18 shows, Trip Advisor co-opts users' existing social networks to encourage them to join their friends by participating within the site. This is an offer that the user can accept or refuse - if they refuse to sign in with Facebook,

[13] Read here as the 'materiality' of the website

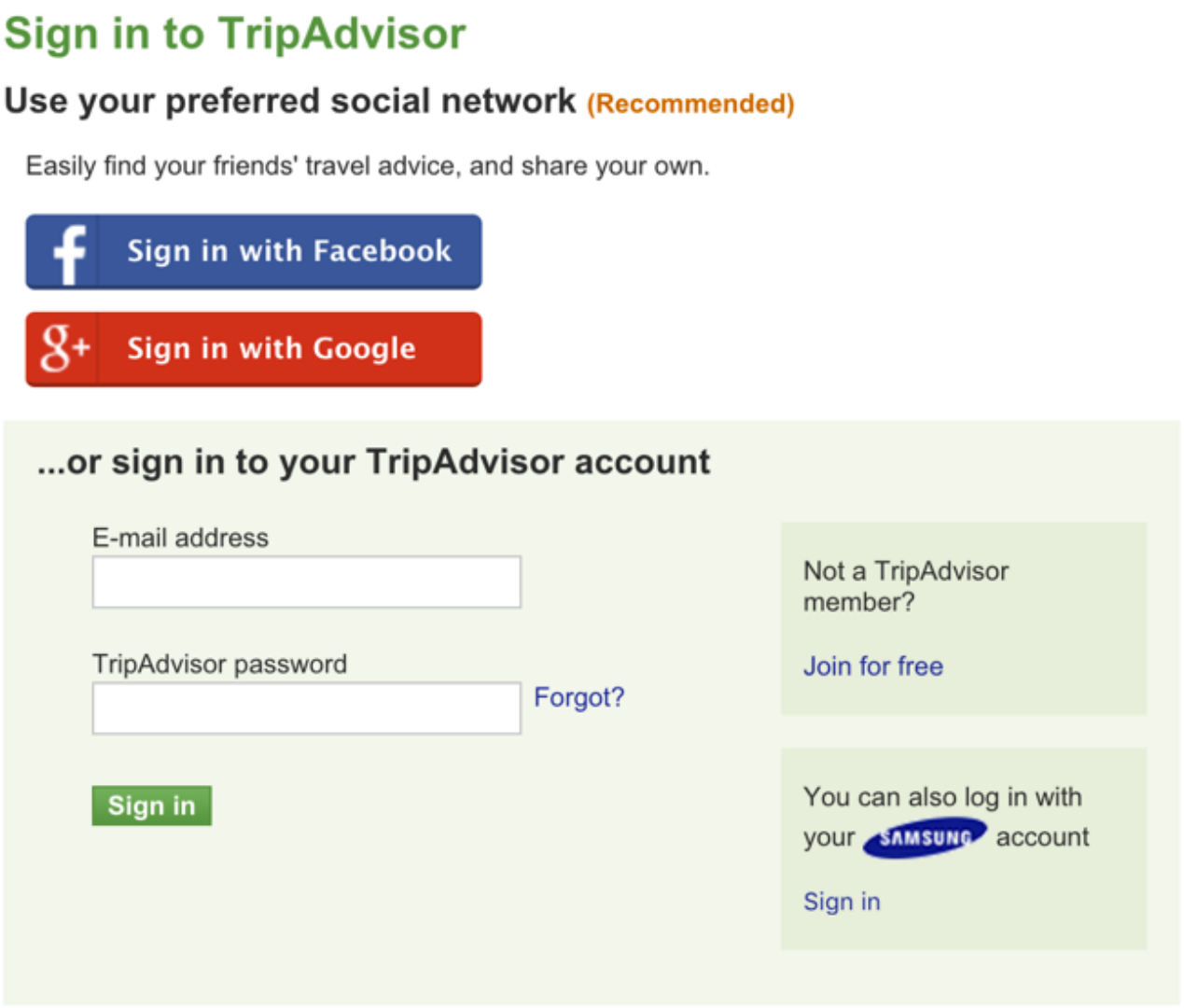


Figure 6.17: Individualisation through logging into TripAdvisor using an existing social media profile

they subsequently miss out on participating on Trip Advisor as part of their friendship network. This is a kind of "offer of subjectivation" (Latour 2005, p. 213) that incites the user to operate as a social actor within the web space, as a unique 'contributor' who posts reviews and ratings that are visible and interactive for friends and the general public. This offers the opportunity to create the self qua contributor, with experiences and knowledge to share publicly. The user qua contributor is not an anonymous entity - it is configured as a unique individual with a name and personalising characteristics and attributes.

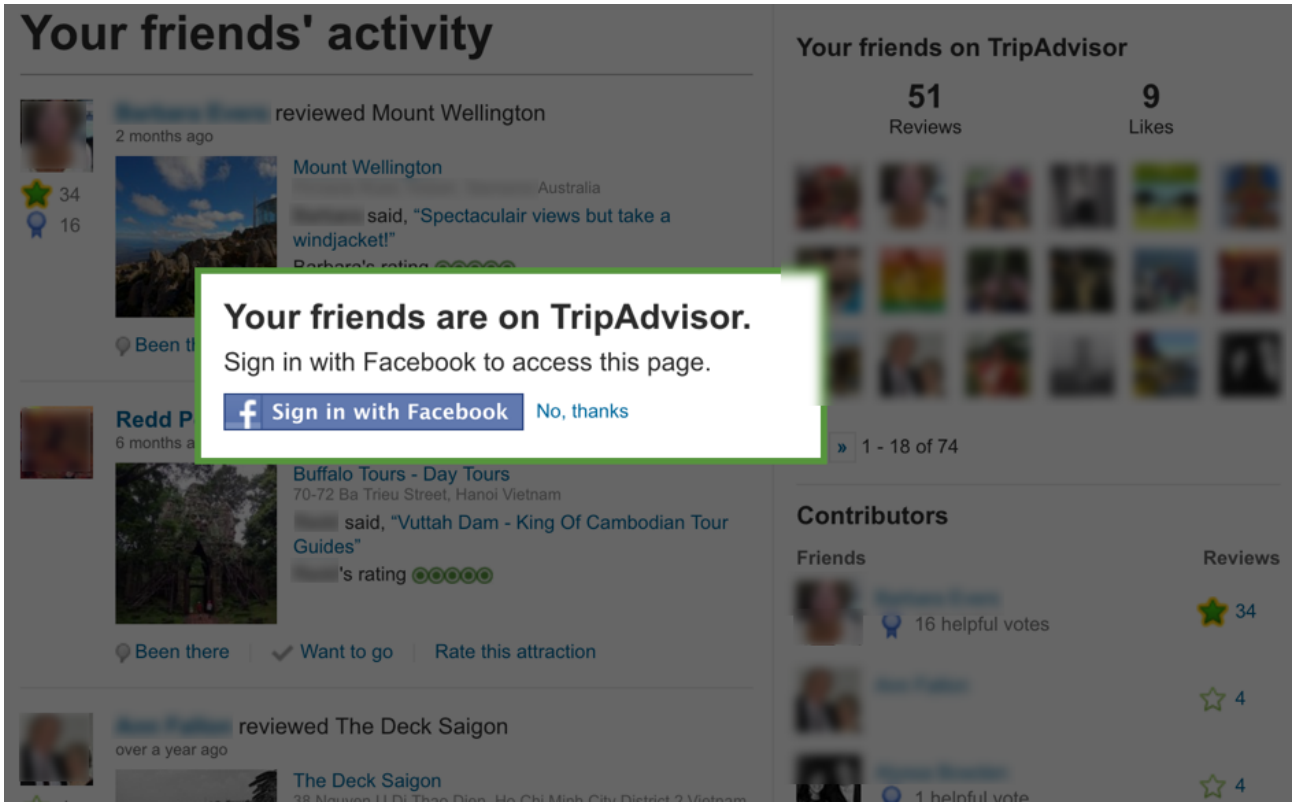


Figure 6.18: Harnessing users' social networks to gain and retain attention on the website

Figure 6.19 shows a selection of labels and categories drawn from various ToC websites in the 'Produsing ToC' modality. These are labels or 'badges' that users are able to apply to themselves and others as a result of activity conducted within the space. For example, on Amazon it is possible for users to 'verify' their profile using their real name, providing a badge next to their reviews that specifies that they are 'actually' or 'really' themselves (e.g., Tim Graham). When 'verified' individuals write reviews and rate content, they are doing it *as themselves*, and this is publicly displayed within the web space. As discussed in Section 6.3.1, the 'truth' or validity of knowledge about the options on offer is established and maintained through ToC that individualise and categorise users through the socio-technical construction of self. The ability to link a particular user review to a 'real' or 'actual' person (or a pre-existing social media profile) is powerful because it lends legitimacy to the knowledge that is produced through the review. As a result, other users may be more likely to take this knowledge into consideration when comparing between options and making choices.

On yelp.com, users are actively encouraged to categorise user reviews as, for example, 'useful', 'funny', or 'cool'. This suggests that over time a Yelp user may come to relate to themselves as

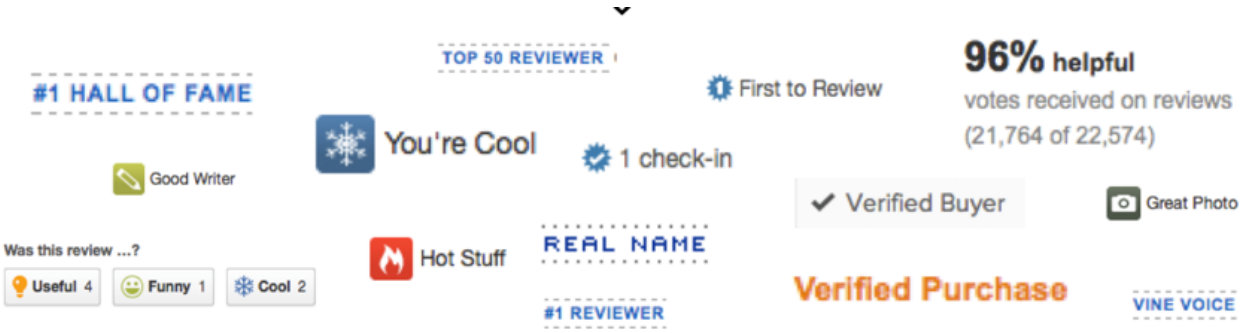


Figure 6.19: The socio-technical construction of self through labels and badges

'funny', as a result of these processes of others' categorization and subjectification. They are individualised through these categories and are able to navigate the landscape of choice in relation to the individuality of themselves and others (who are the funny reviewers? Who are the trustworthy reviewers? Is this a real or verified review? Do other people find my reviews helpful?). These individualising characteristics matter because of their powerful potential for shaping choice. For instance, on Yelp, a user may only wish to take into consideration reviews that have been labelled as 'useful' by other users. Similarly, a reviewer might opt to use humour in their reviews in order to build or consolidate their status as a 'funny' individual within the website. However, this does not mean that ToC cause or determine particular forms of subjectivity, but rather that ToC "attribute various capacities, qualities and statuses to particular agents ... that these agents come to experience themselves through" (Dean, 2010, p. 44). To be sure, Turner argues that we need to exercise caution in making the argument that web technologies create new forms of subjectivity, but at the same time recognise that new electronic media have an increasingly dense and complex role in everyday life (2010, pp. 89-90).

The discussion suggests that websites in the 'Produsing ToC' modality, through processes of categorizing and sorting individuals based on detailed profile characteristics, in a sense contribute to 'making up people' (Hacking 1986). In turn, these characteristics aggregate into a 'population' of users that expresses its own patterns and features, which are amenable to government within the space. Following this, an important aspect of individualisation through the 'Produsing ToC' modality concerns how individuality is deployed to 'target' (Henman, 2004) individuals and stratify segments of the population in order to provide recommendations for goods and services[14]. Two ToC features

[14]This idea has also been developed by Lyon in terms of 'social sorting' (Lyon, 2003; Lyon, 2007). This is not to argue that such processes are new or exclusive to the web. As Henman reminds us: "Although there has been an enormous growth

particularly relevant to this discussion are 'Customer recommendation' (see Section 4.3.4) and 'Personalised recommendations' (see Section 4.3.5).

For personalised recommendations, a key way in which targeting and population segmentation occurs is through the deployment of recommender systems (RSs). As discussed in Chapter Four, RSs are broadly defined as software tools and techniques that use "the opinions of a community of users to help individuals more effective identify content of interest from a potentially overwhelming set of choices" (Herlocker, Konstan, Terveen & Riedl, 2004, p. 5). There are two main sub-branches of RSs: 'collaborative filtering' and 'content-based' (Ricci, 2011). Collaborative filtering involves making suggestions based on a large pool of user-generated data, which "recommends to the active user the items that *other users* with similar tastes liked in the past" (Ricci, 2011, p. 11, emphasis added). For example, Amazon uses a form of collaborative filtering that provides recommendations on product pages: "Customers who bought this item also bought...". On the other hand, content-based RSs focus more on the content itself: "the system learns to recommend items that are similar to the ones that the user liked in the past. The similarity of items is calculated based on the features associated with the compared items" (Ricci, 2011, p.11). Content-based RSs are also exemplified on Amazon through the 'Recommended for you' section of the user profile, which presents a list of recommended products based on purchase history and similarity between items (e.g., books in the same genre or sub-genre).

RSs are an important mechanism in ToC for governing choice because they facilitate website operators to target users through their individuality and segment or 'sort' populations based on individual characteristics. This seeks to minimise the distance between the user and some outcome (e.g., purchasing a product, signing up for a service, submitting a review). If the user is able to navigate the field of options faster and with higher accuracy (i.e., the recommendations befit the user's individuality), then RSs appear to align the goals and rationalities of users and website operators alike. Moreover, choice is *produced* and *reproduced* through recursive processes of population targeting and segmentation, and RSs have a key role to play. In this way, the landscape of choice is reactive to, and also productive of, individuality: each users' experience of choice is, to a greater or less extent, *different*. Users, as individual agents with statistically calculable characteristics, are both the subject and object of calculative practices (Miller, 2008) occurring

in targeting, it is not a new phenomenon but an age-old practice of classifying, stereotyping and dividing" (Henman, 2004, p. 175).

through algorithmic governance in the form of sophisticated, often non-linear, statistical calculations (Introna, 2016; Ziewitz, 2016). Indeed, it is not only users that are subjected to calculative practices, but also the options on offer, which are divided, categorised, and differentiated through processes of content-based filtering. These processes are intelligible but they are also "messy" as Ziewitz (2012) has argued, given that the assemblages of actors involved in targeting and segmentation are complex and heterogeneous, and different types of RSs often operate in tandem, and indeed almost always cannot be directly examined (Introna, 2016; Scott & Orlikowski, 2012).

6.4.2 (Limited) individualisation through 'Delimited and Objective ToC'

Individualisation occurs only in a limited sense for 'Delimited and Objective ToC' websites, and in many cases simply does not apply to ToC. For example, Patient.info (an 'ideal' site discussed in Section 6.3.1) enables users to create individual accounts on the site, which enable users to participate as individuals in the 'Health Community' forums (not considered as a ToC feature, as discussed in Chapter Four) or sign up to the MyHealth health plans (also not considered as a ToC feature). The 'Decision Aids' section of the site, which constitutes ToC, does not take into consideration or utilise user accounts and does not individualise users in a manner akin to 'Produsing ToC' websites. Instead, the focus of the 'Decisions Aids' is on particular illnesses and diseases (e.g., carpal tunnel syndrome) and associated treatment options (e.g., splinting and exercises VS local steroid injection VS surgical release), which are compared using a side-by-side feature (see Section 4.3.2).

Other key examples of limited (or absent) individualisation include the banking ToC websites associated with this modality[15]. For example, bankwest.com.au, which is a 'paragon' site for this modality, enables users to compare between credit cards. Similar to Patient.info, Bankwest uses a 'side-by-side' approach that displays the options in a tabulated format for comparison. There are only 4 types of credit cards on offer, and these are all Bankwest brand. Users are configured to filter out the appropriate choice for their needs, based on the information provided. For example, as Figure 6.20 shows, users can click the 'rewards' button in order to highlight credit cards that suit people who are looking for that kind of characteristic (i.e., a credit card that provides 'rewards' points for

[15]Indeed, 3 out of the top 5 'paragon' sites for this modality were banking sites, namely: bankwest.com.au, bankofamerica.com, and lloydsbank.co.uk.

spending money with it). This kind of ToC functionality does not accord with the processes of individualisation associated with the 'Produsing ToC' modality. However, it is also evident that some sites in the 'Delimited and Objective ToC' modality do engage in a kind of rudimentary level of user profiling and targeting, reflecting limited processes of individualisation.

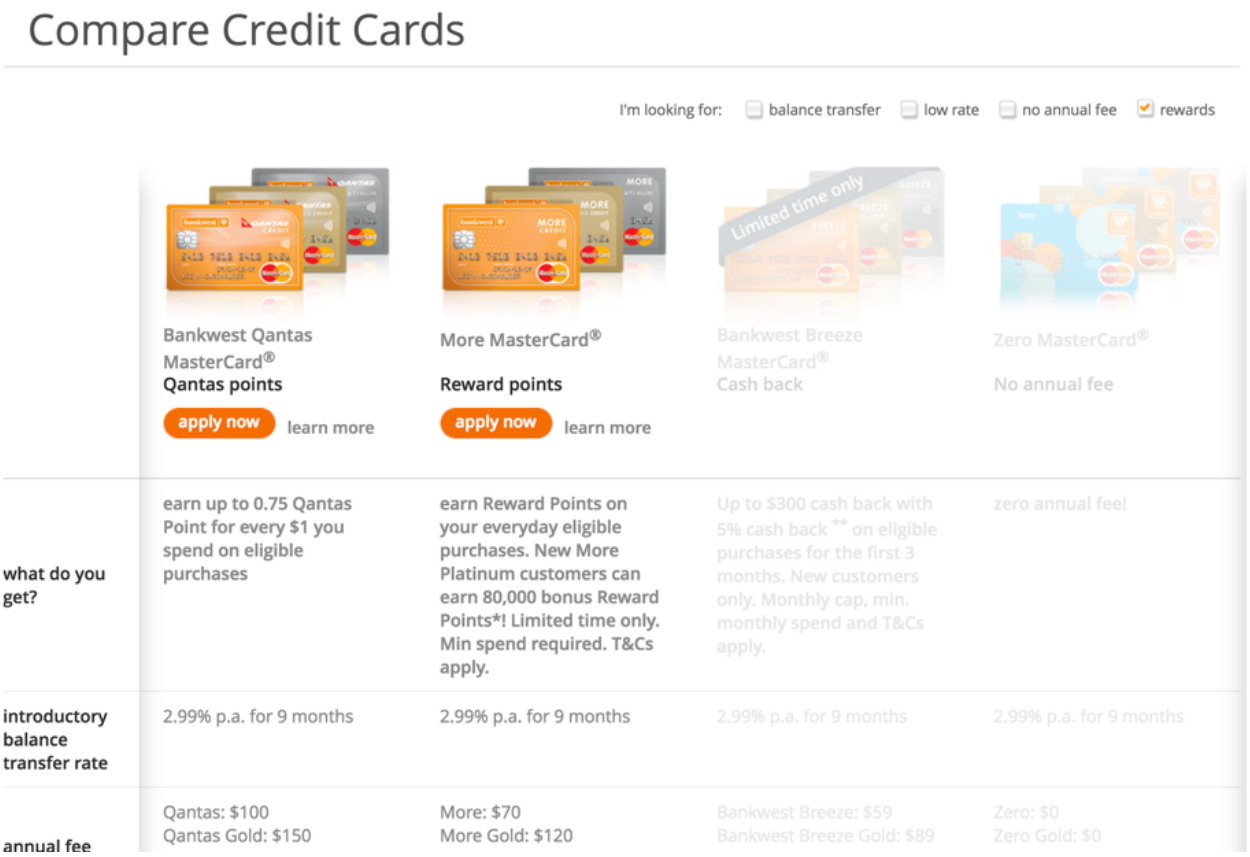


Figure 6.20: Limited individualisation for comparing credit cards through bankwest.com.au

Returning to the example of Virgin Media introduced earlier in this chapter, when comparing between the services on offer through Virgin Media, a button on the sidebar makes a 'jiggling' animation, affording users to click on it. Clicking this button activates the 'Personalised options' ToC, which opens a popup box with the message: "Let's find the broadband package that's right for you". The user is then led through a series of steps where they provide information about their personal situation and requirements (Figure 6.21). After clicking submit, a notification appears stating that "We're tailoring a broadband package that is perfect for you", after which the user is presented with a particular option that "would be ideal for you". The user is prompted "Is this right for you?". Clicking "yes" initiates the process of completing the transaction.

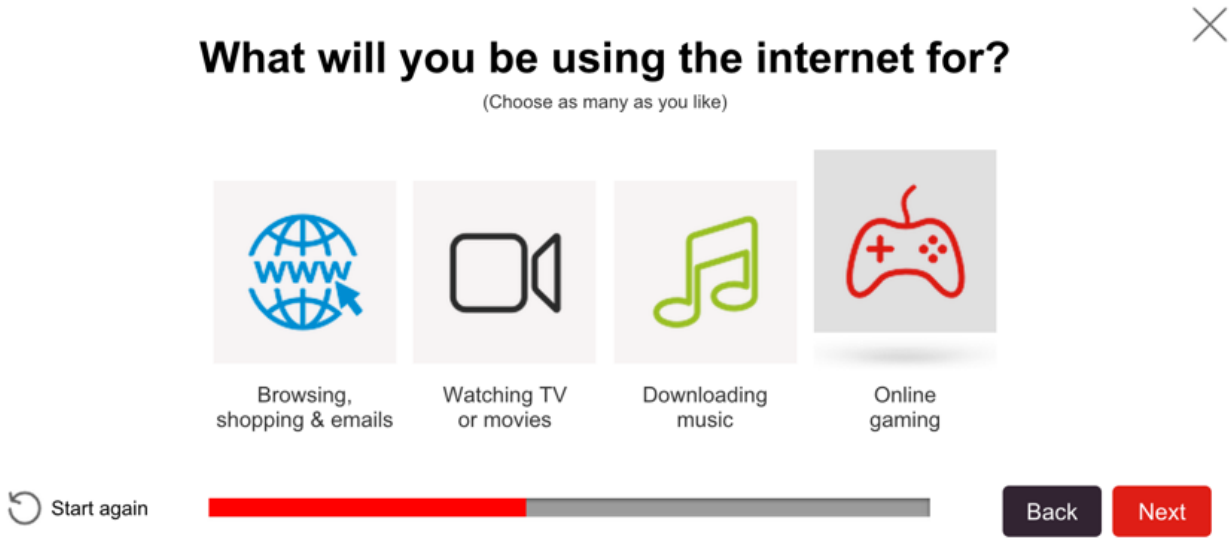


Figure 6.21: 'Help Me Choose' ToC on virginmedia.com

What this process seems to suggest is that ToC are deployed to configure the user within a game of truth that attempts to link up a limited set of individual characteristics with the options provided through the website. In this instance, the affordances of ToC appear to provide a tailored solution to the problem of choosing, in this example, broadband services, but at the same time it is impossible to *not* find a tailored solution. That is, no matter what information the user provides about themselves and their requirements, ToC dispose them towards a package that is the "ideal" choice, even if there are not that many options on offer (i.e., the scale of choice is delimited). So the 'game' always has a solution - there exists a package that is ideal for each individual person and this 'truth' simply has to be discovered using the tools provided.

In this way we observe two interrelated processes at work. Firstly, it is observed that the options on offer are targeted at individuals through a basic or rudimentary level of profiling. The user is asked a series of questions aimed at their individuality - for example, how many people they live with, what they use the internet for, and who is their current provider. The second process involves the role of relatively 'basic' algorithms that operationalise this form of targeted profiling using ToC. The website operators seek to solve a problem, namely how to nudge users towards choosing their products instead of a competitor's, and ToC are strategically deployed in support of this rationality. The algorithm underpinning the ToC provides the ability to solve this problem: it takes some input (the users' individual profile details), performs basic calculations on this input, and outputs the 'ideal package' for the user. Notably, after

the user has used this ToC feature they are provided with a pop-up box (Figure 6.22) prompting them to rate it. This suggests that the website operators are able to govern this ToC feature by accounting for and calculating its effectiveness - in effect using ToC to govern ToC.

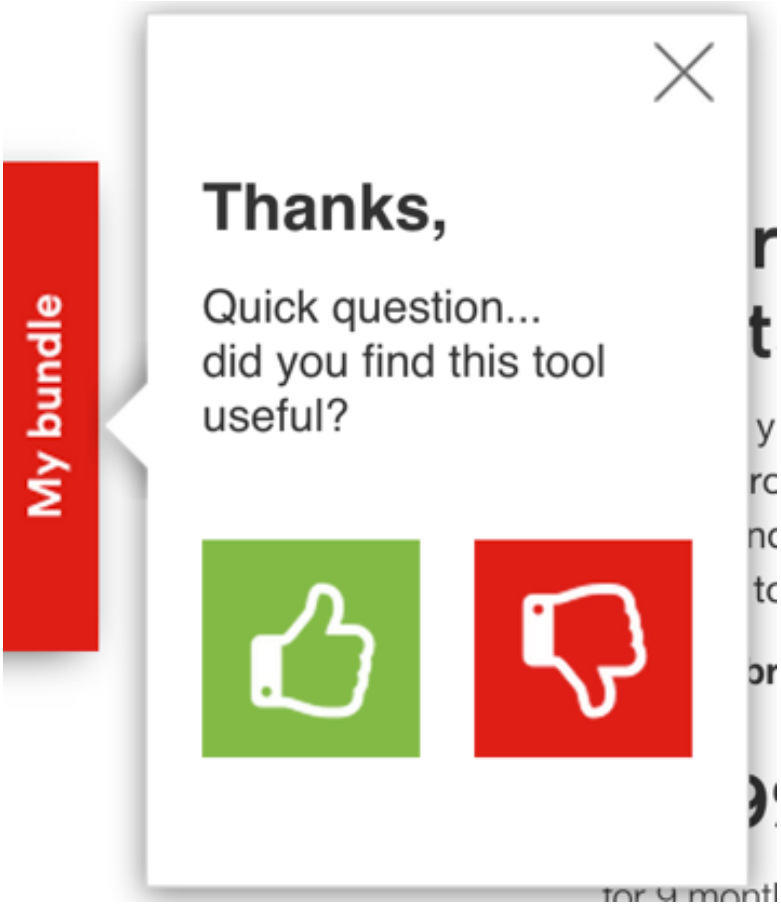


Figure 6.22: Website operators using ToC to calculate and govern ToC

6.5 Political Economies of ToC: choice, capitalism, prosumerism

Broadly, the two ToC modalities govern choice according to different political economies. Websites in the 'Delimited and Objective ToC' modality, such as Virgin Media or Patient.info (which are 'paragon' and 'ideal' sites respectively), tend to operate within a market orientation of the 'producer' and 'consumer'. In this arrangement, users are configured as *consumers* of the goods and/or services that are on offer for comparison. For example, as Figure 6.23 shows, Virgin Media enables users to compare between broadband services, with the option to sign up through a contract with the provider (Virgin Media). As with many websites in this modality, choice is 'delimited': there are only three

types of broadband service on offer, meaning that users are not comparing between all broadband services, but only those offered by Virgin Media. There are key differences between the modalities in terms of the scale at which choice is provided. Over half of sites in this modality provide choice at the scale of 'brand' (55%), compared to only 10% of sites for the 'Produsing ToC' modality. Comparatively few sites in this modality provide choice at a 'global' scale (28% of sites), whereas the majority of sites in the other modality provide a global scale of choice (72% of sites). In this example, although Virgin Media construes its offerings as 'choice', the market or landscape of choice appears to retract away from the broader market context (the 'universe' of broadband services available in the UK). Choice is scaled down, or in other words is a delimited subset of the 'global' scale - but it is nonetheless valorised as choice.

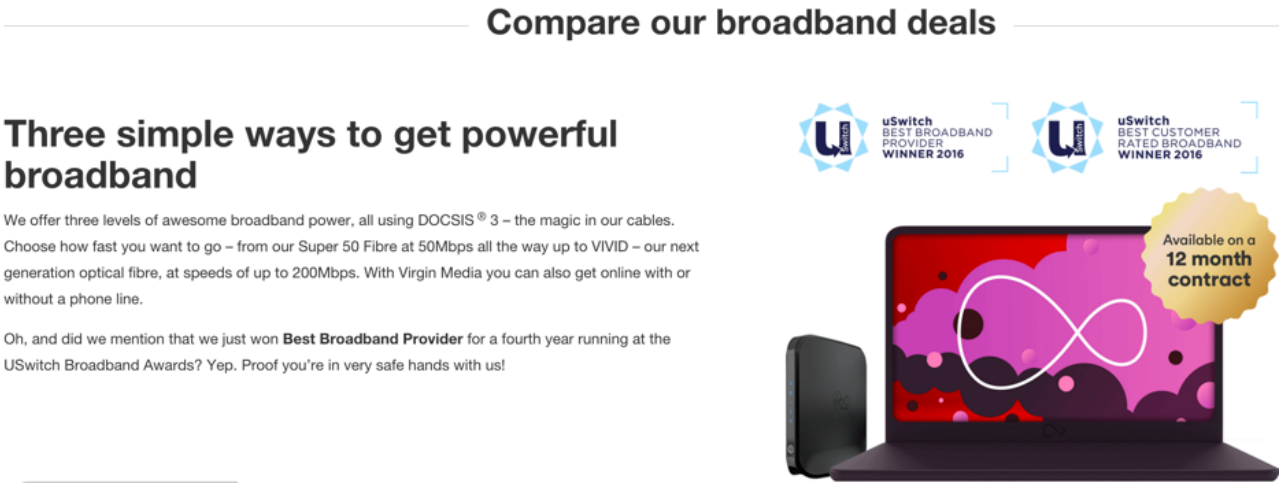


Figure 6.23: Producer and consumer capitalism: comparing broadband services on Virgin Media

On the other hand, 'Produsing ToC' websites often appear to go beyond the dualistic notion of 'producer and consumer' capitalism. This modality follows a different logic to the political economy of the 'Delimited and Objective ToC' modality, where the options on offer are provided by sellers, and users simply compare between them. For the 'Produsing ToC' modality, users are often able to produce or request new types of goods or services that may not have previously existed, and sellers respond to such requests and market demands. In a sense, these markets appear to be constructed through culture as much as 'price', through the hierarchies of goods and services that emerge from the deployment and use of ToC in this context (Blank, 2007). Websites in this modality tend to have an 'on-demand' and 'just-in-time' production logic, providing highly *individualised choice at incredible speed*. They are often more akin to a 'platform' than the traditional notion of a website

(Blank & Reisdorf, 2012; Evans, Hagiu, & Schmalensee, 2006). In this way, platforms such as ebay.com are a kind of 'invisible engine' that other things run on, facilitating transactions and economic interactions between different actors to take place (Evans et al., 2006, pp. 349-355). For example, peopleperhour.com, a 'paragon' site of the 'Produsing ToC' modality, "is a community of talent available to work for you remotely, online, at the click of a button" (PeoplePerHour, 2015). This site enables users to compare between 'Hourlies' (Figure 6.24), which are services that are available to be delivered in as little as one hour. There is an interesting market dynamic exemplified by PeoplePerHour, whereby users are able to buy and sell private services within a market that is constantly changing and evolving in response to its own internal dynamics. Users can not only compare between existing types of *user-generated* services, but also 'Post a Job – let people find you!', specifying what they want done and sellers respond with proposals to supply whatever service is required (Figure 6.25). In this way, the 'Produsing ToC' features deployed by peopleperhour.com not only construct 'hierarchies' of goods and services, but also construct hierarchies of the *producers* of goods and services, who are themselves *users* of the website (Blank, 2007; see also discussion in Section 2.5.3).

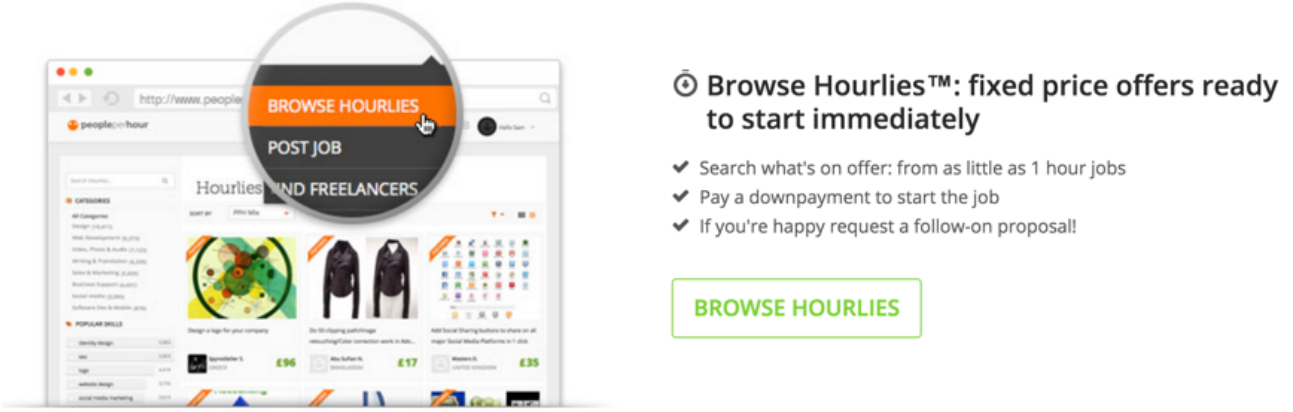


Figure 6.24: On-demand ‘Hourlies’ jobs on peopleperhour.com

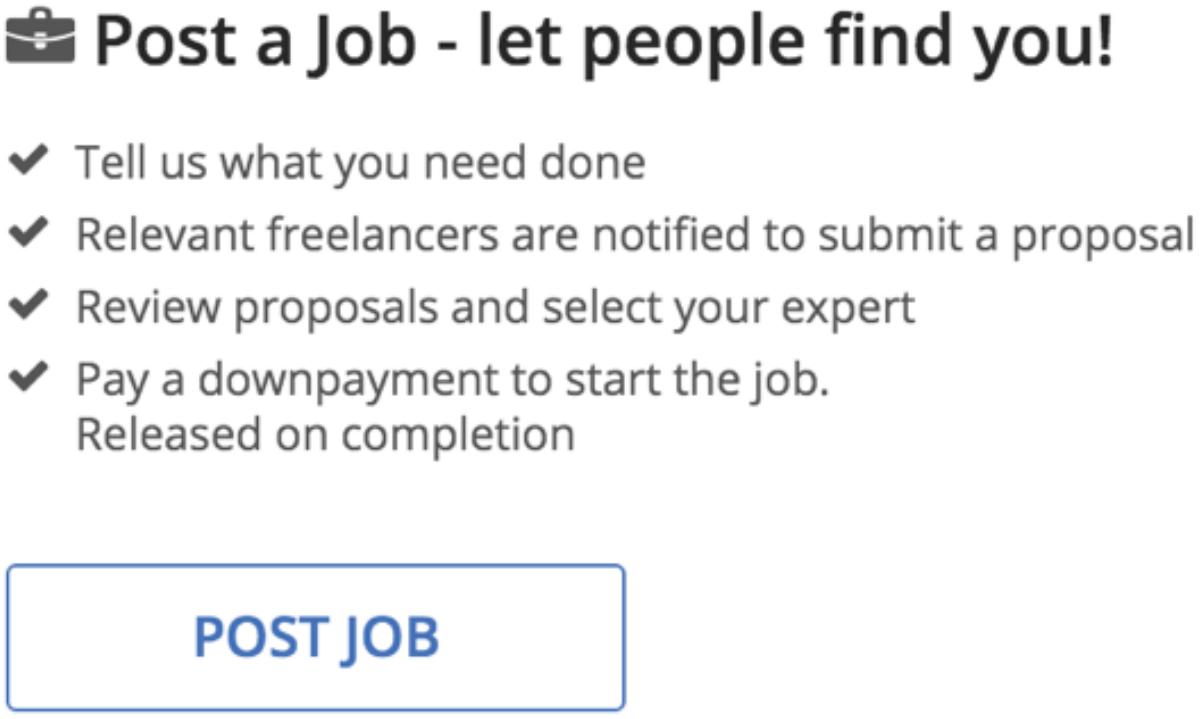


Figure 6.25: Subverting the ‘Options on offer’ on peopleperhour.com

As PeoplePerHour suggests, there is considerable *work* involved in navigating and enacting choice on these platforms, because users are not simply consuming, but also labouring to ‘produse’ content and data. Unlike the ‘Delimited and Objective ToC’ modality, users are not informed by experts or ‘objective’ statistics as to which choices are on offer or most suitable: they must do this for themselves using the functionality provided. The humble ‘sortable list’ (Section 4.3.2.1) features on 93% of sites in the ‘Produsing ToC’ modality, compared to only 62% for the other modality. This

functionality, interpreted in this study as a ToC feature, emerges as extremely important for the political economy of the 'Produsing ToC' modality. Users must perform work in order to compare between options and enact choice, by sorting through many different 'characteristics of commensurability' (Section 4.3.1) and searching for options (Section 4.3.3) amidst a global range of choice. This is not so much the case for the 'Delimited and Objective ToC' modality. For instance, almost all 'Produsing ToC' websites deploy 'ratings' (97% of sites) and 'reviews' (95% of sites), compared to 30% of sites in the other modality. Indeed, the 'Produsing ToC' modality deploys a much larger range of 'characteristics of commensurability' to sort through the options on offer, for example: 'location' (63% of sites compared to 36% of sites in the first modality); 'Filter by features' (96% compared to 68%); 'price' (84% compared to 65%); and 'recency' (46% compared to 27%).

The 'platform' logic of sites in the 'Produsing ToC' modality helps to explain how the political economy operates: the website operators provide a platform that 'choice' runs on (or is an emergent property of), without needing to curate and control it directly. Choice is, at least partly, a 'network effect' that emerges from platforms (Blank & Reisdorf, 2012). Thus, for the 'Produsing ToC' modality, choice involves a lot of work and production on the part of the 'consumer'. The dualism of producers and consumers does not fully attend to the political economy of this modality. In attempting to reconcile this, I argue that 'Produsing ToC' websites tend be oriented towards what Ritzer has termed 'prosumer capitalism' (Ritzer, 2015a). Ritzer and Jurgenson argue that "in producer and consumer capitalism, corporations are likely to exert great control over the production and/or consumption of content (goods and services), but in prosumer capitalism companies are more likely to stand back and to meddle less with the prosumers who are producing and consuming the content" (2010, p. 31). The idea of 'prosumption' provides an interpretive key to the 'platform' logic of many websites in the 'Produsing ToC' modality, which involves *both* production and consumption rather than a specific focus on either one (Ritzer & Jurgenson, 2010, p. 14). It also accounts for the considerable work or labour that is involved in producing, navigating, and transacting choice for sites in this modality. Who are prosumers in this modality? They are users who not only work to 'produse' and navigate content in the web space, but in doing so also shape the market processes and political economy in which 'choice' operates. Ritzer provides a key insight, arguing that users are

> "increasingly making all-but-the-most-complex travel arrangements on one's own through various websites (e.g., Travelocity, Expedia); doing all of the work on websites

> such as Amazon.com including making the appropriate choices for items to be purchased, providing needed delivery and payment information, and making one's way through the various steps needed to complete the process; as buyers doing the largely digital work of providing a body of information on themselves to eBay and if (when) they are sellers on that which they are offering for sale"[16] (Ritzer, 2015b, p. 12).

Through the prosumption processes of the 'Produsing ToC' modality, users provide free digital labour that is highly beneficial to other users, but even more so for website operators (Anderson, 2010). There is a blurring of leisure and labour time (Fuchs, 2014) that characterises digital prosumption and the political economy of 'Produsing ToC' websites. For example, yelp.com (an ideal site in the 'Produsing ToC modality) does not directly sell goods or services, but the tools it provides users to navigate choice (i.e., comparing businesses and restaurants) generates massive amounts of data that has capital value through advertising and investment. Furthermore, the tools provided to users enable them to tailor 'choice' in more and more niche and specific ways, and this has a performative effect on the market (Callon, 1998), which recursively responds to new and emergent 'prosumer' demands generated with great speed. Figure 6.26 shows an example of private services on PeoplePerHour that are extremely tailored and niche services, and may be popular today, but not tomorrow. Indeed, websites in the 'Produsing ToC' modality provide affordances for configuring and enabling this kind of political economy to flourish, as users are able to easily navigate and sort through what the 'latest' services are, or who is most 'popular', or which services are most recently added. For example, one-quarter (26%) of 'Produsing ToC' sites deploy the 'customer recommendation' ToC feature (compared to 1% of sites in the other modality). As discussed in Chapter Four, the customer recommendations feature enables users to specify whether or not they recommend a particular good or service (e.g., a 'yes' or 'no' button). This provides a percentage figure, often displayed in large text, indicating how many people recommend the option (e.g., '86% of people recommend this product' or '5% would buy again'). ToC features such as customer recommendations have an incredible productive power because the market responds to, and is performed by, the prosumer capitalist dynamics that these features facilitate. Denegri-Knott & Zwick (2012) have explored this in relation to eBay, arguing that it is a space in which desire is rapidly produced and reproduced through prosumption processes. In this way, 'Produsing ToC'

[16] Incidentally, all four of the example sites in this quote appear in the study sample for Phase Two, namely Travelocity, Expedia, Amazon, and eBay.

websites facilitate buyers and sellers to navigate a shifting landscape of choice, rather than a landscape that is static (where the options on offer and the knowledge about such options changes infrequently over time).

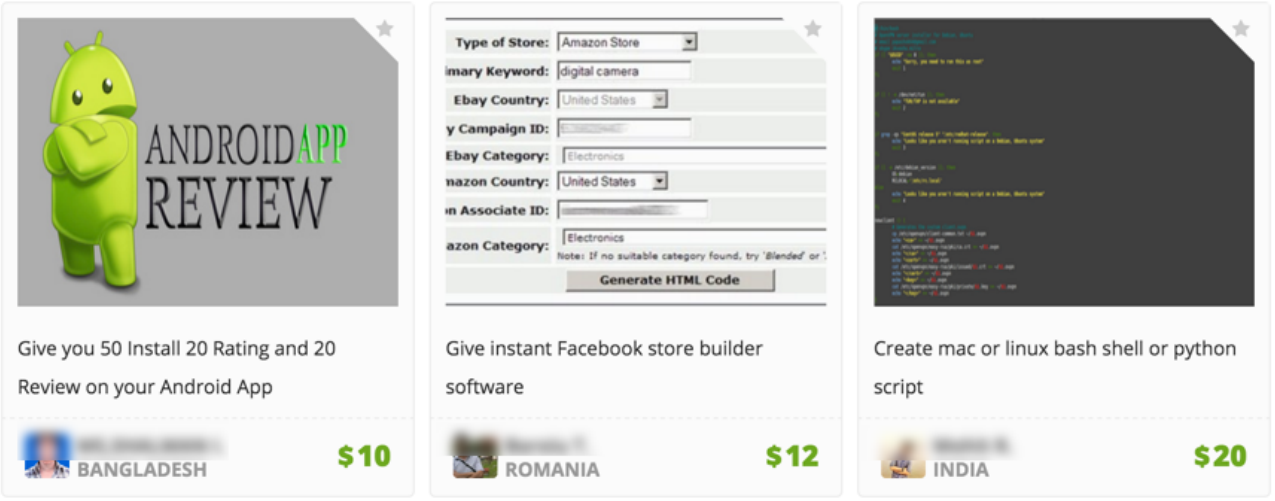


Figure 6.26: Highly individualised and specialized private services on peopleperhour.com

The performativity of markets in the 'Produsing ToC' modality suggests that these websites are, as MacKenzie (2006) puts it, not simply 'cameras' that present choice and enable comparisons between different options, but are more akin to 'engines' that *drive and expand* choice. This idea resonates with the notion of platforms as 'invisible engines' discussed previously (Evans et al., 2006). The implication is that this ToC modality may produce *more choice* at the same time as making it easier for users to navigate the over-abundance of it. As discussed previously, this can be understood as a 'network effect' that emerges when ToC websites qua platforms gain large numbers of active users (Blank & Reisdorf, 2012). For example, 74% of 'Produsing ToC' websites deploy the 'suggestive search' feature (compared to 46% for the other modality). This feature suggests options to the user as they type into the search form (discussed in Section 4.3.3.2), and these suggestions are driven by a database that is constantly updated by user search queries and the dynamics of the market (e.g., new brands of products emerging for sale). This feature becomes more useful as more people use it, and furthermore it drives, performs, and expands choice whilst simultaneously helping users to navigate choice. Drawing on the ANT perspective established in Chapter Two, the discussion here provides further evidence that ToC escape any kind of simplistic characterisation as mere 'tools' for navigating choice. These technologies have unpredictable effects that arise from their construction, usage, and evolution—they do other things and are in this sense 'unruly' (Wynne, 1988). This also raises key

questions about what ToC are actually doing, or rather what they are not doing (reflected upon further in Chapter Seven).

6.6 Conclusion

This chapter has argued that there are two broad 'modalities' of how choice is governed through ToC. These modalities reflect different epistemologies that share a common telos: veracity and the production of 'truth'. In this way, each ToC modality utilises different forms of empiricism enrolled in 'games of truth' that seek to construct veracious knowledge. This is a game of truth that that frames what is a 'good' versus 'bad' choice, and configures users differentially within the game. The first modality, 'Delimited and Objective ToC', is characterised by an appeal to expertise and objective positivism, which governs choice by enacting *truth through reason*. On the other hand, the 'Produsing ToC' modality draws on 'crowd-sourced' knowledge in an attempt to produce *truth through experience*, that is, the subjective experience of individuals. Epistemological tensions and contradictions can arise when ToC websites deploy ToC features from *both* modalities, but such tensions are managed by configuring users to correctly read or interpret the knowledge that circulates within the web space.

The notion of individualisation emerges as a key to understanding how ToC govern choice. The 'Produsing ToC' modality governs choice through *individuality*, via processes of individualisation that harness the social and agential capacities of users and tend to operate more like Web 2.0 'platforms' rather than traditional websites (a Web 1.0 logic). There is a 'participatory' logic to choice for websites in this modality: the space in which choice is exercised is highly reactive to individual characteristics and activity, and is governed through a strategic link-up between the *raison d'être* of website operators and users qua individuals. In contrast, the 'Delimited and Objective ToC' modality does not govern choice in this fashion. Websites in this modality tend to configure users as 'anonymous readers' and processes of individualisation occur in a much more limited capacity, if at all.

Following on, the political economies of ToC are positioned differently according to each modality. For the 'Delimited and Objective ToC' modality, users are generally positioned to select between

pre-constructed options. The affordances of this modality enable *commercial* website operators to, in differing degrees, delimit the scale of choice on offer whilst at the same time producing the feeling of 'global' and 'informed' choice. Similarly, the affordances of this modality enable *non-profit* website operators (e.g., health sites) to curate choice in the interests of producing the 'informed' user/consumer. In contrast, the 'Produsing ToC' modality appears to configure users as 'prosumers' who, in differing degrees, are enrolled simultaneously as producers *and consumers* of the options on offer. The 'prosumer capitalist' logic of this modality means that algorithms are enrolled to facilitate users to navigate and sort through a sprawling and complex world of choice that changes constantly in a feedback loop with market processes. These algorithms modulate flows of information, regulating the network effects that emerge from Web 2.0 platforms, thus shaping the discursive space in which choice is governed.

Chapter 7

Conclusion

7.1 Introduction

The title of this thesis, *Technologies of choice: The shaping of choice on the World Wide Web*, suggests a wide-ranging and potentially important phenomenon in contemporary, technologically advanced societies. Choice is fundamental to self-formation and life chances, and is integral to 'consumer societies' based on production and consumption. Nowadays, choice is a ubiquitous part of everyday life, and leading scholars argue that we are facing an over-abundance of it. Moreover, we do not experience and enact choice in neutral spaces, but in spaces that are highly shaped and governed: the shopping mall, the hospital, the restaurant, the insurance office, the car yard, and recently *online*. Nowadays, websites such as Amazon and Trip Advisor are used by millions of people to navigate and experience choice. Yet, the way in which choice is shaped and governed through the architecture of such websites has barely attracted sociological attention. This thesis has engaged with this problem by examining how choice is *constructed* and *governed* through the architecture and design features of websites, referred to as Technologies of Choice ('ToC').

In engaging with the thesis topic, one over-arching research question and three sub-questions were posed (see below). Before engaging with the answers to these questions, a brief overview of the structure of this chapter is provided. The chapter is divided into five main sections. First, a summary of findings is provided that synthesises the key conclusions of the study. This section is structured

into three parts, which relate generally to findings for Chapter Four, Chapter Five, and Chapter Six. The second section considers the study's contribution to knowledge and to key debates in the literature. Third, some limitations of the thesis are addressed. In the fourth section, key areas for future research are set forth and I make several recommendations for 'where to next' in light of the study's contribution and findings. In the final section I conclude the study with a reflection on its meaning and relevance now and into the future.

- *(RQ1)* How is 'choice' constructed on the web?

- *(SQ1)* What are the different features of websites that constitute and structure choice?

- *(SQ2)* How widespread are ToC on the web and what are their patterns of distribution?

- *(SQ3)* What different types of ToC are identifiable and to what extent do they shape choice differently?

7.2 Summary of findings

The 'over-arching' research question in this study asks how choice is constructed on the web (RQ1), which is further operationalised and examined by three 'sub-questions' listed in the previous section (SQ1, SQ2, and SQ3). This section is organised into three sub-sections that summarise the findings of the study as they relate to, and provide answers for, the over-arching research question and the three sub-questions. The first sub-section provides a summary of the different features of websites that constitute and structure choice, which are categorised and presented through the ToC conceptual framework (answering SQ1). Proceeding from this, the second sub-section reports on how widespread ToC are on the contemporary web and their patterns of distribution, providing foundational empirical knowledge about this phenomenon and addressing SQ2. The third sub-section addresses the question of whether there are different types of ToC identifiable through the different deployment of ToC features, and the study finds that there are two main types or 'modalities' of ToC. Moreover, the two ToC modalities shape choice differently, and these

differences are discussed according to three key themes that emerge from, and help to make sense of, the study findings, namely: epistemology, individualisation and subjectivity, and political economy.

7.2.1 Constructing choice through ToC

The over-arching research question (RQ1) asked how 'choice' is constructed on the web, operationalised through three sub-questions: SQ1, SQ2, and SQ3. This thesis argues that choice on the web is constructed using ToC, which both presupposes and shapes choice through the architecture and design features of web spaces. The aim was to conceptualise the notion of ToC through the development and refinement of a theoretically and empirically attuned conceptual framework. The ToC conceptual framework contributes to the literature a conceptual and theoretical tool that researchers can use to empirically analyse how choice is constructed and governed in online spaces. It provides a 'taxonomy' of the different features that are available to be deployed to construct and govern choice on the web.

The development of the ToC conceptual framework involved two steps. First, in Chapter Two, the ToC conceptual framework was developed by drawing on the literature, resulting in four theoretically-attuned 'dimensions' that broadly categorise how choice is constructed, namely: 'Having Choice'; 'Facilitating Choice'; 'Knowledge Production'; and 'Configuring Users'. These findings provided part of the answer to SQ1. Second, in Chapter Four, the conceptual framework was refined and developed empirically by analysing a sample of top-ranking websites that deploy ToC (i.e., interpreted as 'ToC websites'). This analysis provided the remainder of the answer to SQ1, and resulted in the addition of 12 'sub-dimensions' and 56 design 'features' to the conceptual framework. Figure 7.1 shows the revised ToC conceptual framework, including the findings relating to each 'sub-dimension' and the 'features' that correspond with each sub-dimension.

The refined conceptual framework maps a diverse 'taxonomy' of ToC features that websites may (or may not) deploy in constructing a space where choice is experienced and exercised by users. The strategic deployment of ToC features enables website operators to govern choice in different ways, by shaping the space in which choice is exercised without necessarily determining or 'controlling' choice. ToC provides the means to construct a *space of choice* that is strategically aligned with the aims and rationalities of the website operators, whilst simultaneously linking up to the aims and desires of

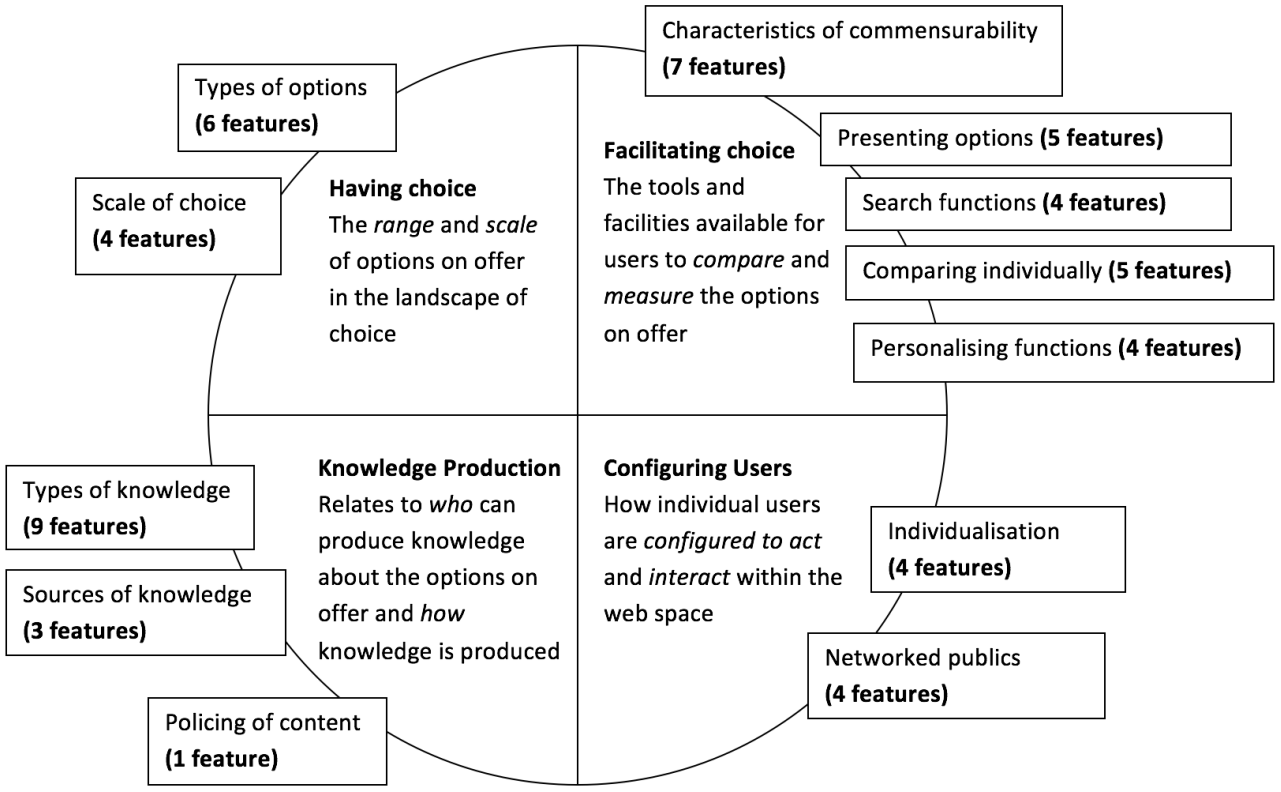


Figure 7.1: The revised and elaborated ToC conceptual framework

individuals. Website operators are able to differentially shape and construct choice by deploying (or not deploying) any of the 56 ToC constructs identified in the conceptual framework. I will now briefly outline the features that were found through the analysis in Chapter Four relating to the first research sub-question (SQ1): what are the different features of websites that constitute and structure choice?

Dimension 1: Having Choice

First, through the 'Having Choice' dimension, I found that the range and scale of choice presented in web spaces is shaped according to the types of options on offer and the scale at which choice is provided. In thinking about choice as an abstract right or capability, I identified a critical distinction between the concepts of 'choice' and 'decision-making' by drawing on and developing the difference between 'having choice' and 'making choice' (Barnett et al., 2008; Ogden et al., 2009; see also Clarke, 2010). Moreover, contrary to the focus in the literature on comparisons between products (interpreted in this study as private goods), it is evident that ToC websites broadly enable comparisons between six types of options, which were categorised using economic theory into the first sub-dimension 'Types of options'.The second sub-dimension, 'Scale of choice', examines how choice depends on the *scale*

at which it is provided. Not all websites provide choice at a 'global' scale. For instance, choice can also be scaled according to 'brand', which provides the appearance or feeling of choice, while actually delimiting the scale of options on offer to a small subset.

Dimension 2: Facilitating Choice

The 'Facilitating Choice' dimension charts a diverse range of tools and facilities that can be deployed by websites to enable users to navigate and compare between alternate options, that is, to 'facilitate choice'. The deployment of these different features shapes choice in broadly five ways, relating to the five sub-dimensions. The first sub-dimension, 'Characteristics of commensurability', finds that there are broadly seven characteristics that enable users to render options commensurable in order to compare them (i.e., through procedures of sorting and ranking). The second sub-dimension, 'Presenting options', examines how options are visually presented to the user on the screen, based on their characteristics. Five features were identified. The third sub-dimension, 'Search functions', finds that search functionality is important for ToC, and that there are primarily four types of search functions that differentially facilitate choice. The fourth sub-dimension, 'Comparing individually', charts how options on offer can be compared *indirectly*, by examining a given option individually on its profile page. Five features were identified. The fifth sub-dimension, 'Personalising functions', has four features that categorise the ways in which users are able to compare between options and make decisions in a *uniquely individualised way*.

Dimension 3: Knowledge Production

The 'Knowledge Production' dimension examines how knowledge about choice is constructed through ToC. As discussed in Chapter Two, I recast *(semantic) information* about the options on offer as *knowledge*, calling into question how knowledge is produced in online spaces where choice is experienced and enacted. Three sub-dimensions were found to capture the different ways in which this occurs.

The first sub-dimension, 'Types of knowledge', examines how options on offer are represented digitally as 'knowable' entities. It was found that there are nine different types of knowledge that comprise the fundamental 'building blocks' for constructing knowledge about choice. The second sub-dimension, 'Sources of knowledge', provides a classificatory system for examining *where* knowledge comes from, that is, where the types of knowledge are sourced from. This sub-dimension

classifies sources of knowledge into three types. The first, 'Users', refers to knowledge that is produced by 'everyday' users of websites (i.e., not necessarily experts or administrators of websites). The second, 'website operators / experts', refers to types of knowledge that are derived from the website operators or individuals who are authorised by the website to provide 'expert' knowledge about the options on offer. The third, 'institutional authorities', is defined as any organisation or authority (i.e., typically—but not always—non-commercial and/or non-government) that conducts and provides independent research relating to options on offer in ToC. The third sub-dimension only includes one feature, which examines whether users are authorised to 'police content' within the web space alongside the website operators, for example, by 'flagging' fraudulent reviews or notifying website administrators about suspicious options on offer (e.g., 'scam' services or counterfeit goods).

Dimension 4: Configuring Users

Fourth, the 'Configuring Users' dimension examines how the design of ToC websites may 'configure' users (Woolgar, 1991) by not only presupposing or defining who and what they are, but also establishing parameters that shape the kinds of actions that users can undertake. It was found that this occurs in broadly two ways, comprising two sub-dimensions. The first sub-dimension, 'Individualisation', examines whether, and how, users are configured to experience themselves as *individuals* with unique profiles and self-reflexive actions within the web space. As the name suggests, this sub-dimension draws heavily on the individualisation thesis developed by Beck and others (Beck, 1992; Beck & Beck-Gernsheim, 2002; Bauman, 2000; Giddens, 2001). Four features were identified. The second sub-dimension, 'Networked publics', examines how users are configured (or indeed not configured) as social agents that are able to interact with other users. This sub-dimension draws and extends boyd's notion of networked publics. Four features were found and categorised into this sub-dimension, which, when deployed, configure users within networked publics that contribute to building and shaping the landscape of choice through their sociality.

7.2.2 ToC on the web

Whilst the previous sub-section provided a range of findings, it did not address empirical findings about the extent and distribution of ToC on the web more generally. How widespread is this phenomenon? What ToC features are the most common? What are the patterns of their distribution?

Are there different types of ToC that represent sets of ToC features that tend to be deployed together? These questions comprised the focus of the research sub-questions SQ2 and SQ3, and this sub-section provides a summary of the findings relating to these questions.

To answer SQ2 and SQ3, the revised conceptual framework was deployed as an analytical tool to empirically examine ToC on the web. 500 top-ranking websites were examined across 5 website 'categories' (100 sites per category): 'Global', 'Recreation', 'Health', 'UK', and 'Australia'. This analysis sought to determine the scale and nature of how ToC are deployed amongst top-ranking websites and their patterns of distribution and characteristics. Moreover, this provided a basis to reason theoretically about how choice is shaped and governed through ToC, fulfilling the primary concern of the thesis (see next section).

The results of this analysis demonstrate that ToC are widespread on the contemporary web. Over one-third (193 out of 500) of the top-ranking websites examined in this part of the study deploy ToC. Sites in the recreation category (e.g., TripAdvisor and Yelp) tend to deploy ToC most often (75% of sites). Around a third of the top-ranking sites in the UK and Australia deploy ToC (38% and 29% respectively), indicating that ToC is important for people living in these countries. ToC are important for health-related websites, with around one-third of sites in this category deploying ToC (29%). At a global level, about one-fifth (22%) of the highest-ranking sites across the entire web deploy ToC. These findings suggest that ToC constitutes a kind of 'infrastructure of modernity' (Feenberg et al., 2003), or, more specifically, an 'information infrastructure' (Bowker et al., 2010) that is used to construct and govern choice across a diverse range of contexts, including commercial, consumer, health, and across different countries (Australia and the UK in this study). Not surprisingly, ToC are most often deployed by commercial websites (.com), although the health category has a higher proportion of non-profit or not-for-profit sites (.org).

Although there is a tendency in the literature to focus on comparison between 'products' on the web, this study finds that most ToC sites (in the sample of 193 sites) provide comparisons of 'private services' (67% of ToC sites), followed by 'private goods' (42% of ToC sites). *Services*, rather than goods, emerge as the dominant type of option on offer through ToC. Moreover, a large majority of ToC websites offer choice in respect to a single 'type of option' (84% or 162/193), that is, either private goods or private services. On the web, choice is also often 'scaled', meaning that the options compared in a given ToC website (e.g., restaurants, cars, or shoes) are not *all* the options in a

'global' market, but a delimited subset of options. In this way, whilst nearly two-thirds (59%) of sites provide a 'global' scale of choice, about one-quarter (27%) of sites scale choice to 'brand', for example, ikea.com provides comparisons of Ikea brand furniture and homeware. A further 10% of sites scale choice according to geography or jurisdictional boundaries, and 7% of sites provide choice through contractual arrangements that dictate what options are on offer for comparison. Thus, 'choice' is often (somewhat paradoxically) produced through the *delimitation* of options on offer.

Significantly, two-thirds (66%) of sites deployed nominal ratings (e.g., the '5 star' rating used by sites such as Amazon). Thus, although ratings are an important characteristic of commensurability, there are other characteristics that are used to make comparison between different options possible, that is, to facilitate choice. Not surprisingly, the 'price' feature is deployed by three-quarters (75%) of ToC sites, although this feature is highly underrepresented by sites in the health category. Over half of sites enable users to sort and compare options by 'location' (55%) and 'bestselling / popular' (54%), with about one-third of sites enabling comparisons by 'recency' (39%) and 'relevance' (30%). The study also found that two-thirds (65%) of sites provide 'reviews' of options on offer. Thus, although reviews are important, other features such as 'similar items' (36% of sites) and 'customer recommendation' (17% of sites) enable users to compare options individually within the profile page of each option.

In terms of choice and personalised functionality in ToC, the majority of sites (78%) were found to enable users to 'transact' or 'complete' the choice process, for example, by making a purchase or signing up to a service, although less than half of health sites enable this feature (45% of health sites). Further, sites such as Amazon are renowned for providing 'personalised recommendations' through sophisticated recommender systems, for example, *"Customers Who Bought This Item Also Bought..."*. On the whole, this study found that about one-fifth (19%) of sites deploy personalised recommendations, although for sites in the 'global' category this increased to 50%.

There was considerable variability regarding who is able to produce knowledge through ToC websites. Not surprisingly, ratings (including nominal, unary, and binary) and reviews strongly tend to crowd-sourced from users. On the other hand, knowledge produced through 'textual descriptions', 'images', and 'videos' tends to be highly curated by website operators, often excluding users from contributing or 'produsing' this information. Additionally, control over website content is often shared between website operators and users in a kind of 'hybrid epistemology' - indeed about one-fifth of sites source knowledge from both users and website operators / experts. Overall, a

comparatively small percentage of knowledge is sourced from 'institutional authorities', but this source of knowledge played an important role for *statistical* comparisons (13% of statistics relating to the options on offer are derived from institutional authorities). Additionally, about half of ToC websites enable users to 'police' content on the website (47% of sites).

Generally, most ToC sites in the study sample enable users to have their own personal profile or user account (93% of sites), enabling them to participate on the site as individuals rather than anonymous users. However, the extent and manner in which individualisation of users occurs depended on other features. Notably, around one third of sites (39%) enable user profile details to be publicly visible to other users and the general public, exposing certain kinds of personalising details (e.g., gender, age, interests), but also activity conducted within the site. In this way, about one third of sites used a kind of 'gamification' logic to categorise users with badges, levels, and achievements, based on their activity in the web space (e.g., becoming labelled as a 'funny' reviewer). Approximately a quarter of ToC sites deployed 'User account / verification'. For example, Amazon displays a 'RealName' tag next to users who have verified their true identity, and a 'Verified Purchase' tag next to product reviews, indicating that the user has actually purchased the product they are reviewing.

Furthermore, there are different ways in which ToC websites configure users to participate, and hence experience themselves and others, as members of 'networked publics' (boyd, 2011). For instance, one third of ToC sites (37%) enable users to evaluate each other, for example by rating other users' reviews (e.g., helpful / not helpful). A third of sites (33%) configure users to communicate directly with each other, for example through direct messaging or commenting on user-submitted reviews. Often the social experience is not limited to the ToC site itself. One third of ToC sites (35%) enable, or even encourage, users to log in using an existing social media profile such as Facebook or Twitter, positioning them to share content with their own social networks (e.g., "Check out my review of Apple Store in New York"). It is evident from these findings that ToC sites often harness the individuality and sociality of users for the ongoing function and maintenance of the web space.

Overall, the findings suggest that there are patterns to how ToC features are deployed (or not deployed), which appear to shape choice in different modes and capacities. What are these patterns? This question was addressed in SQ3, and the next sub-section outlines the key findings.

7.2.3 The two ToC 'modalities'

Like all infrastructure, ToC features are not deployed uniformly across the landscape of the web. The study found that there are broadly two types or 'modalities' of ToC, which have different affordances for shaping and governing choice through websites. These modalities represent two different sets of ToC features that tend to be deployed together within websites. The first modality is named 'Delimited and Objective ToC' and approximately 40% of the websites examined were clustered into this modality. The second modality is 'Produsing ToC', and accounts for the majority of websites (60%). Three key themes characterise how each modality shapes and governs choice in different ways (see Chapter Six). The themes are: 'Epistemologies of ToC' (see Section 6.3); 'Individualisation and Subjectivity of ToC' (see Section 6.4); and 'Political Economies of ToC' (see Section 6.5). These themes are highly interrelated and link up to one another, but at the same time embody relatively distinctive accounts of how choice is shaped and governed through ToC, particularly in respect to how the modalities clash and contrast with one another. I will now summarise the findings as they relate to each ToC modality, paying close attention to the three themes discussed in Chapter Six.

Governing choice through the 'Delimited and Objective ToC' modality

Firstly, the 'Delimited and Objective ToC' modality tends to have an epistemology that produces *truth through reason* (see Section 6.3.1). Websites in the 'Delimited and Objective ToC' modality defer to expertise and 'objective' or scientific positivism to construct legitimate knowledge or 'true discourse' about the options on offer, which occurs primarily in the form of standardised statistics and/or expert qualitative knowledge. In contrast to the 'Produsing ToC' modality, this modality tends to appeal to knowledge generated *externally* to the website, for example by expert individuals or authoritative organisations. For example, one of the 'paragon' sites of this modality was virginmedia.com, which enables users to compare a small set of Virgin brand telecommunications services, and appeals to an external authority in order to legitimate or establish the veracity of their knowledge claims about the options on offer (e.g., that their broadband services are statistically faster and higher quality than other broadband services). Similarly, an 'ideal' site of this modality was patient.info, a non-profit site that enables users to compare health treatment options based on information generated and curated by medical experts. Drawing on Foucault and later scholarship, the study finds that the 'Delimited and

Objective ToC' modality positions users within a 'game of truth' (Gauthier, 1998; Foucault, 1980) that seeks to produce truth through veridical discourses (Rose, 1999a).

Following on, although individualisation emerged as a key aspect of how choice is governed through 'Produsing ToC' websites, it has little role to play for 'Delimited and Objective ToC' websites (see Section 6.4.2). For the 'Delimited and Objective ToC' modality, users are often configured as a kind of 'anonymous reader', whereby websites do not tend to be reactive to, or constitutive of, individuality. In the uncommon instances where users are targeted or segmented according to their individual characteristics, this tends to be quite limited or rudimentary compared to the 'Produsing ToC' modality. For health-related sites in this modality, the telos is more aligned with providing undifferentiated users with 'objective' choice, rather than driving differentiated users towards purchasing a good or service, or retaining user attention.

In terms of political economy, 'Delimited and Objective ToC' websites tend to present a *highly curated subset* of options for users to compare (rather than 'global' choice), and a relatively low amount of information and characteristics of commensurability regarding the options on offer (e.g., price, features, popularity). This modality has affordances for carefully curating the web space in line with the rationality of 'objective' choice: *this* option or *these* options is/are objectively better than *that* option or *those* options. Users are largely configured as passive consumers of the options being compared, reflecting a kind of 'producer and consumer' capitalist logic. For commercial 'Delimited and Objective ToC' websites, the affordances of ToC enable website operators to delimit the scale of choice whilst at the same time producing the feeling of 'global' and 'informed' choice. Busch's notion of standardised differentiation (Busch, 2011) emerged as a key to understanding this mechanic, whereby ToC link up to existing standards in order to differentiate between what are otherwise fairly identical or similar goods and services, whilst still retaining a logic or feeling of 'choice'.

Governing choice through the 'Produsing ToC' modality

The 'Produsing ToC' modality has a fundamentally different epistemology to the 'Delimited and Objective ToC' modality. To generate a true discourse about the options on offer, 'Produsing ToC' websites tend to produce *truth through experience*, based on the subjective experiences and ethical dispositions of everyday users, through processes of 'crowd sourcing' (Hammon and Hippner, 2012)

and 'produsage' environments (Bruns & Schmidt, 2011). For this modality, 'truth' is generated *internally* to the website, using algorithmic techniques to sort, maintain, and regulate the user-generated content within the space (e.g., ratings and reviews), in order to valorise it as legitimate (or illegitimate) knowledge. Websites that exemplify this modality include amazon.com and tripadvisor.com. Although there is a dichotomy between the epistemologies of the 'Delimited and Objective ToC' modality and the 'Produsing ToC' modality, this dialectic does not fully attend to some websites, such as the UK government's *NHS Choices*, which are positioned 'in between' the modalities. Websites that govern choice in this 'hybrid' fashion configure users in two concurrent games of truth, where tensions and contradictions, and perhaps even opportunities, can arise from two different forms of empiricism that simultaneously operate within the web space.

Furthermore, in contrast to the other modality, 'Produsing ToC' websites present a landscape of choice that tends to shift and transform in relation to individual subjectivity and actions. Indeed, many 'Produsing ToC' websites are unable to operate without the activity and productive capacities of individuals who inhabit and 'produse' (Bruns, 2011) the web space. Users are almost always provided the ability to have unique user accounts, which provide individual public profiles that become tied to one's sense of self. Indeed, users are often able to login using existing social media profiles (e.g., Facebook), which may further intensify processes of individualisation and self-reflexivity. 'Produsing ToC' sites such as Yelp afford a unique and individualised social experience for users through features that classify and categorise them into social categories and roles (e.g., Tim is an "Elite" reviewer). Recommender systems are deployed to provide individualised recommendations to users that target them through their unique preferences and attributes. More than simply 'produsing' web content, users of 'Produsing ToC' websites are configured as co-governers of choice: the space is governed by strategically linking up the interests and ethics of web users with the *raison d'être* of website operators, in mutually beneficial relationships.

The political economy of the 'Produsing ToC' modality stands in contrast to the 'Delimited and Objective ToC' modality. Produsing ToC' websites govern choice in a manner that is not readily explained in terms of a 'producer and consumer' capitalist logic. Instead, drawing on Ritzer and Jurgenson (2010), I argue that these websites tend to embody a kind of 'prosumer capitalism' (Ritzer, 2015a). Users of the 'Produsing ToC' websites are not passive consumers - they are

configured as, perhaps even compelled towards, taking on the role of 'prosumers' who perform work, and for some websites post and produce new types of goods and services, while at the same time acting as consumers. Algorithms, including recommender systems, are enrolled to sort and modulate large economies of user-generated information that flows in a feedback loop through the web space. The findings suggest that choice is *performed* while at the same time presupposed and presented. This accords with and extends Ziewitz's analysis of web-based evaluation practice, which he finds is "peculiar in that it enacts its own intelligible character" (2012, p. 3) by "[establishing] itself as a decontextualised manifestation of good and bad, relevant and irrelevant, useful and useless" (2012, p. 317). The paradox of 'Produsing ToC' websites, perhaps, is that they may actually produce *more choice* whilst at the same time making it easier to navigate it.

7.3 Contribution to knowledge

7.3.1 Understanding 'choice' in a web-mediated world

This thesis has introduced and examined a novel field of inquiry at the intersection of choice and web technology, which is innovatively conceptualised as ToC. It inherits a body of scholarship that recognises choice as an important topic for sociological study. This study contributes to perspectives that denaturalise choice as an *a priori* phenomenon. As Chapter Two described, 'free choice' does not simply exist, but is actively made: individuals may be 'free' to choose, but such freedom occurs in spaces that are constructed, shaped, and governed (see Section 2.1). In this study, I have taken this idea and applied it to study *online spaces*, making a substantial and foundational contribution to the literature.

This thesis has called into question the popular conception that the web provides a world of choice, by showing how choice is always shaped and governed through the localised online spaces in which it operates (websites in this study). I have asked not *whether* choice is increased or decreased by digital technologies (see Kleine, 2010; Kleine; 2013), but instead asked *how* choice is shaped through the materiality of the online space in which it is experienced and enacted. Moreover, I have not focused solely on ratings, rankings, and reviews in a Web 2.0 context (see Scott & Orlikowski, 2012; Ziewitz, 2012), but have asked what types of architecture and design features of websites contribute to shaping

and governing choice, which distinguishes this research from previous empirical work. The four overarching 'dimensions' of the ToC conceptual framework provide one answer to this question, and these dimensions inherit and contribute to existing and emerging scholarship in several key ways.

The 'Having Choice' dimension of ToC contributes to an understanding of choice as an *abstract capability and external reality*, examined in terms of the types and scale of options on offer. While most existing studies tend to conflate or confuse the concepts of 'decision-making' and 'choice', this study makes a critical distinction between these two concepts by drawing on and developing the difference between 'having choice' and 'making choice' (Barnett et al., 2008; Ogden et al., 2009). Although previous studies tend to focus on online comparisons between 'products' (i.e., private goods), the findings of this study show that there is almost no limit to the 'types of options' (Section 4.2.1) that ToC enable users to compare between. Through ToC almost anything can be rendered commensurable and positioned into an online space in which choice is experienced and enacted. Indeed, as previously discussed, for ToC websites, *services* are more prevalent than goods.

This study also contributes an understanding of how (ToC) websites can produce the 'feeling' or appearance of choice while actually delimiting the options on offer in varying degrees of intensity (see Section 4.2.2). We often think of choice as expansive and perhaps 'global', but this study demonstrates that in the online world this is not always the case. For example, Netflix[1] is a global provider of streaming films and television series, providing highly individualised (and useful) recommendations to users. However, recent controversies in popular news have centred on how Netflix does not provide the same choice to all users - it delimits the options on offer according to where the user is geographically located (without telling them that their choice has been reduced).

In thinking about choice as an external reality (i.e., dependent upon the options on offer), current research suggests that there is 'too much' choice in contemporary society (Iyengar, 2011; Clarke, 2010; see also Section 2.1.2). This study contributes to this debate by demonstrating that ToC may simultaneously *reduce* choice (by helping people navigate it), but at the same time also *produce and perform* choice (see Section 6.5). To be sure, this study does not conclude that ToC 'reduce' or 'create more' choice *per se*, but rather that the modalities of governing choice have a productive power that produces choices at the same time as presenting them.

[1] Netflix.com

The 'Facilitating Choice' dimension of ToC is congruent with dominant conceptions of 'online decision-making tools' that characterises much of the literature. This dimension focuses on the tools and facilities within the web space that enable users to navigate and compare between alternate options, that is, the notion of 'making choice'. However, this study did not limit the focus to ratings, reviews, and ranking devices, which are often the main focus of recent studies (see, for example, Ziewitz, 2012; Blank, 2007; Scott & Orlikowski, 2012, Hearn, 2010), nor assess their efficacy in a particular context. Chapter Four shows that these devices are positioned alongside a diversity of other features or tools that help users to navigate choice, comprising 25 features classified into 5 sub-dimensions within the 'Facilitating Choice' dimension (listed in Section 7.2.1). This contributes to a deeper understanding of how choice qua decision-making is facilitated through the practical tools deployed within websites through rating and ranking devices.

7.3.2 Knowledge production and 'truth' in contemporary society

Although the relationship between technology and knowledge inherits a wide variety of debates and perspectives in the literature, this study has specifically engaged with, and contributed to, understanding how web technologies, and in particular ratings, reviews, and rankings devices, are enrolled in knowledge production (Ziewitz, 2012; Scott & Orlikowski, 2012). The ToC conceptual framework broadens the scope of enquiry for how web technologies shape knowledge practices, by relating it to 'choice'. The study positions ToC as a kind of machine of knowledge production, which generates knowledge about the value of things *at scale* through processes of commensuration and classification (e.g., *this* book is a better choice than *that* book). While existing studies tend to focus on the 'Web 2.0' epistemologies of, for example, 'crowdsourcing' (Hammon & Hippner, 2012), 'produsage' (Bruns & Schmidt, 2011), and 'the wisdom of crowds' (Surowiecki, 2004), this study finds that choice on the web is shaped by two different forms of empiricism, reflected by each ToC modality. Hence, the 'Produsing ToC' modality aligns with, and extends, our understandings of how everyday web users become enrolled as authors and curators of knowledge. For this modality, knowledge is produced and regulated *internally* to the website (e.g., through user-submitted ratings and reviews). On the other hand, the 'Delimited and Objective ToC' modality defers to expertise and 'objective' or scientific positivism to construct legitimate knowledge, and this tends to occur *externally* to the website, e.g., by reference to existing statistics, studies, or bodies of knowledge. In

this respect, epistemological tensions and contradictions can arise when different technologies (i.e., the ToC modalities) produce knowledge about the same things (e.g., goods or services on offer) in the same space (i.e., the website).

Following this, an enduring theme in STS and sociology is the role of *categories and standards* in producing, ordering and shaping social processes. The 'Facilitating Choice' dimension of the conceptual framework contributes to contemporary debates around infrastructure, categories, and standards, headlined by Bowker, Star, and other scholars. In this way, the five sub-dimensions and 25 features of the 'Facilitating Choice' dimension contribute to understanding of ToC as an infrastructure that governs choice through web-mediated practices of classification and commensuration. Positioning this study in relation to these debates contributes a better understanding of how particular technologies (in this case ToC) can, through their usage, become *entrenched* and imbricated in everyday life, suggesting that they have become *standards* (if they are not already). ToC are machines of knowledge production because they mediate and propel knowledge production in relation to 'choice' (e.g., *this* service is better than *that* service). From the users' perspective, features such as 'nominal ratings' and 'sortable lists' are a way of getting things done (navigating a complex world of choice based on the characteristics of the options on offer), but the instrumentality of these technologies is overflowed by the deeper issue of how they mediate and drive knowledge in contemporary society. Moreover, ToC features afford users to compare between what would otherwise be incommensurable entities (e.g., a cooking book and a romantic comedy film). This is a powerful, and somewhat under-appreciated, aspect of these seemingly mundane features of websites.

Yet, there is a 'shadow side' to how choice is facilitated on the web through ToC, which exposes *epistemology* as perhaps the most important theme regarding how choice is shaped and governed through the web (see Section 6.3). Where does the knowledge about the options on offer derive from and how is it established as legitimate or 'true' knowledge? This question ties into longstanding and current debates about how knowledge is produced through processes of classification and categorisation. Drawing on Foucault and later scholarship, I argue that ToC are enrolled in 'games of truth' that frame what is a 'good' or 'desirable' choice versus a 'bad' or 'undesirable' choice. The idea that ToC help users to find out the 'truth' about different options they wish to compare is what makes ToC useful for people, and attests to the prevalence and popularity of ToC on the contemporary web. Yet, the ToC modalities appear to operate according to two fundamentally

different forms of empiricism: *truth through reason* (Section 6.3.1) and *truth through experience* (Section 6.3.2). This finding contributes a new understanding to knowledge production in the context of Web 2.0, notably the idea of produsage (Bruns, 2008a; Bruns & Schmidt, 2011), as well as crowd-sourcing (Hammon and Hippner, 2012) and the wisdom of the crowd (Surowiecki, 2004). It both draws upon and goes beyond these ideas by showing how knowledge is not simply produced by users, but is highly curated and governed within the web space. At the same time, it does not reduce an analysis of choice on the web to 'Web 2.0', but considers the full range of web technologies that are prevalent to ToC, including so-called 'Web 1.0' technologies. In doing so, it contributes new understandings of how web technologies are implicated in knowledge practices in the contemporary world. As Bowker et al. suggest, "we need to be sensitive to the development and spread of new ways of knowing across information infrastructures" (2010, p. 113). There are continuities and discontinuities: this study has highlighted *new ways of doing old things* (e.g., configuring users as 'produsers' within the website to produce and expand knowledge about choice through the 'wisdom of the crowd') and *old ways of doing new things* (e.g., drawing externally on 'expert' authorities to produce legitimate knowledge about choice within a website).

7.3.3 Technology, society, and the self

Nascent scholarship has examined how space accomplishes governance (see Woolgar & Neyland, 2013), and this study adds to this debate by examining *online* spaces, that is, how the 'materiality' of web spaces governs choice. Moreover, as discussed in Chapter Two (Section 2.5), there are possibilities for combining a governance perspective with key ideas within STS such as 'technical mediation', 'intentionality', and 'hybridity' (see Section 2.2.1). I have attempted to make these links and develop them in the context of choice and web technologies. The two ToC modalities represent two broad 'architectural' forms that shape and govern choice within web spaces (see Chapter Six). These modalities have different *technological affordances* for governing choice through the web.

From the perspective of *technology and ethics*, the ToC modalities differentially shape the quality and types of interactions or fusions (Dorrestijn, 2011) between human and non-human actors that converge within the space. The hybridisation of humans and ToC is important to understand because ToC *technically mediate* choice and choosers, suggesting an important area for studies that examine

the ethics of these technologies. Whilst this study has not provided insights as to whether ToC lead users to internalise the norms and priorities of website operators, or taken a normative stance in relation to deploying ToC in particular social contexts, the discussion in Chapter Six provokes an interesting line of inquiry. For example, consider Trip Advisor. It is increasingly common practice for hotels and businesses to display badges earned through Trip Advisor (and other ToC websites) on the physical structure of their buildings. In this sense, the business may come to identify or 'brand' itself in relation to the categories espoused through ToC. The surprising implication is that potential guests do not even have to 'go online' and engage with ToC, as the badge displayed prominently on front door already informs them that this is a highly rated establishment.

The 'Configuring Users' dimension of ToC is indebted to Woolgar's idea that users of technology are not separate to technologies, but are defined, enabled, and constrained (that is, *configured*) in relation to them (1991). I have drawn upon this perspective and extended it to examine how the design and architectural features of web spaces configure users in particular ways, while at the same time presupposing how such websites should be used. In doing so, this study contributed new understandings of how web users are configured in relation to 'choice'. It developed key links between STS perspectives of how individuals are constructed in relation to technology and wider debates about individualisation and self-hood in the context of the contemporary web. In thinking about how choice is shaped and governed through the 'Produsing ToC' modality (the most common modality), the user emerges not as a separate entity (i.e., the singular chooser), but as a fundamentally interconnected component with multiple lines of connection to, from, and perhaps through, ToC. This is not to argue that *all* users are configured in this fashion (e.g., only a fraction of users post ratings and reviews), but that the space configures users in particular ways and, in turn, the shaping effect this has on 'choice'.

7.3.4 Methodological innovations in computational sociology

This study also contributed to the field of computational sociology, which uses an interplay of computer science methods, social theory, and empirical data to answer sociological questions (Hummon & Fararo, 1995). To answer research sub-question 3, I used a novel application of multiple correspondence analysis (MCA) and hierarchical clustering (HC). These statistical methods,

which are rarely utilised in sociology[2], enabled me to extract far more insight from the data than initially anticipated. In a sense, these methods enabled SQ3 to pose a computational 'data mining' problem that would inform the theoretical discussion in Chapter Six. Indeed, the categorical dataset relating to SQ2 and SQ3 consisted of a spreadsheet with 193 rows (i.e., 'ToC websites') and 56 columns (i.e., 'ToC features'), for a total of over 10,000 data points. Analysing this dataset to answer SQ3 (and the over-arching mandate of the thesis) posed a considerable challenge, and MCA and HC emerged as highly useful tools suited to the task. This involved a computational approach to analysing and making sense of the data, relating it to existing theory, and developing new theory. A related innovation of the study was that all of the analysis for SQ2 and SQ3 was conducted in the R programming language, which is an open-source software package (as discussed in Section 3.2.2). In this way, I was able to write R scripts that other researchers will be able to use and benefit from in their own research, making it much easier to replicate, modify, and extend the methodology used in this thesis. [3].

7.4 Limitations

This study has not attempted to establish a universal theory or account of how choice is shaped through web technologies. Instead, it has offered one approach to conceptualising and empirically examining a heterogeneous assemblage of "messy" web-based practices and technologies (Ziewitz, 2012, p. 23). Indeed, there is no such thing as a 'perfect' study and, like all research, this thesis has a number of limitations.

In attempting to coherently conceptualise and examine this research topic, my position and capacities as a researcher undoubtedly influenced the study and its findings. In answering the first research sub-question (SQ1), the development of the ToC conceptual framework presented a challenging conceptual and empirical space, with many 'rabbit holes' and 'dead ends' encountered along the way. The sample of 30 top-ranking websites was limited to English (my native tongue), and the four supplementary websites were purposively selected in line with the aims of the study and the literature (see Section 3.1). The sample size was limited by the time required to undertake analysis,

[2] With some notable exceptions, such as Pierre Bourdieu, as discussed in Chapter Three (see Section 3.2.2).
[3] The associated R code will be made freely available in the near future. Please contact the UQ eSpace.

although as noted in Chapter Three, a satisfactory degree of 'data saturation' was achieved with the sample of 34 websites. Furthermore, the website analysis to answer SQ1 required a degree of reflexivity in order to account for my own sensibilities and position in analysing the websites qua texts. This analysis involved an extensive amount of classification and boundary work, which sought to categorise the structural dimensions of choice within web spaces, and cohere these into a conceptual framework. This work imputed a logic of choice to websites, without reducing them merely to choice, or enforcing any kind of singularity or essentialism about their construction or purpose. It was tedious and challenging work, and by no means 'perfectly' conducted. As discussed in Section 3.3, issues relating to trustworthiness and rigour were aided by regular discussions and audit by thesis supervisors, including memos and detailed comments. Similarly, publication and presentation of a peer-reviewed conference paper provided valuable insights and feedback into the limitations and methodological considerations pertinent to the study.

Analysis of the 500 top-ranking websites involved a different, but related, set of methodological considerations. Like the sample of 34 websites relating to SQ1, the sample for SQ2 and SQ3 was limited to English-language sites, and a level of purposive sampling was used to mitigate the commercial bias of top-ranking sites in the 'global' rankings (Section 3.2). The sample size was limited by my own capacities and resources within the time frame of the study - even the 'conservative' estimate of a sample of 500 websites proved challenging (of which 193 were 'ToC websites'). Whilst a relatively large sample size was intended to improve generalisability, it is possible that a larger and more representative sample of websites would provide more rigour.

7.5 Areas for future research

7.5.1 How people use and interpret ToC

A key area of future research is to study how people use and interpret ToC when making choices in different contexts. The question as to *whether* individuals use ToC is implicitly answered via the research design of this study: only top-ranking sites are examined, meaning that millions of people use ToC. However, the study does not include an analysis of *how* individuals use or interpret particular ToC features, *why* individuals use ToC, or whether ToC influence or 'nudge' users towards making

particular choices (Thaler & Sunstein, 2009). Although clearly important, these questions are outside the scope of the thesis. By the same token, the study does provide conceptual and analytical tools for future research to study how people experience and make choices on the web, including whether, and how, ToC nudge users to make particular decisions.

Prior to this study there was no framework to examine or understand the different design features of websites as they relate to 'choice'. The ToC conceptual framework enhances and broadens the scope of what is possible to study in relation to online decision-making. In Human Computer Interaction (HCI) research, future studies could utilise the conceptual framework to identify what aspects of the site users are looking at and clicking on, and identify and reason about this in terms of ToC. Are some features more useful than others? Which ToC features are most suited to particular choice-making problems (e.g., choice in a commercial setting versus a health setting)? How do users interpret and make sense of different ToC features that are presented to them (e.g., a unary rating VS a binary rating VS a nominal rating)? Furthermore, public policy scholars could use the conceptual framework when studying the use and role of ToC for individuals or institutions, for example by studying whether, and how, state-operated ToC websites such as NHS Choices 'nudge' users in a public policy context. From a marketing perspective, existing studies of online decision-making have a strong focus on *ratings* devices and how these correlate with purchasing behaviour and/or user satisfaction. The 'Facilitating Choice' dimension of the conceptual framework broadens the horizon, providing a taxonomy of 25 website features that relate to decision-making. Any or all of these features, including but not limited to ratings devices, could be drawn upon in a marketing context to understand which web-based tools users find most helpful, and how different tools correlate with different outcomes for purchasing behaviour and/or satisfaction. Similarly, future studies may wish to examine whether there is a correlation between ToC features and website ranking. Which ToC features correlate with a higher ranking and more web traffic?

7.5.2 Social policy: ToC and the state

As discussed in Chapter Two (Section 2.1.2), this study had a particular interest in the uptake and deployment of ToC by the state. This interest stemmed from the recent uptake and deployment of

web technologies by advanced liberal welfare states (e.g., Australia and the UK) in line with 'choice-infused' public policy. This constituted an important area of knowledge in light of current debates around the appropriateness and role of choice in public policy, particularly in health and social care. As Chapter Two described, recent studies suggest that web-based approaches to delivering 'choice' in public services are complex and have wide-ranging implications for individuals (see Section 2.5.4).

As discussed in Chapter Five, government-operated ToC websites were highly underrepresented in the top-ranking websites in the study sample relating to SQ2 and SQ3. Out of 193 websites in the sample, only two were government-operated and these were both in the UK, namely NHS Choices[4] and Transport for London[5]. Therefore, although advanced liberal welfare states have begun to deploy ToC as part of choice-infused public policy, these sites generally do not rank as highly as sites in the private and non-profit sectors.

In terms of areas for future research, the ToC conceptual framework provides a tool to critique and also improve existing government-operated ToC websites, such as NHS Choices in the UK. What ToC modality do government websites tend to operate in, and what are the affordances of ToC for governing in a social policy context? As discussed in Chapter Six, one interesting line of inquiry is to analyse ToC in terms of 'memory practices' (Bowker, 2005), and how ToC features such as ratings mediate the strategic recording and forgetting of knowledge within broader 'memory regimes' (see Section 6.3.3). This has particular relevance to social policy. For example, on the NHS Choices website, nominal ratings provide a kind of database-driven, temporally-constrained 'archive' that strongly suggests a role in accountability and public evaluation of public services. Unlike commercial ToC websites such as amazon.com and yelp.com, nominal ratings on NHS Choices are temporally-constrained to a two-year time period, such that ratings older than two years are 'forgotten' and no longer included in the overall average rating for each service provider. Clearly, this has useful affordances for governing in accordance with the advanced liberal rationalities of cost-effectiveness, performance, self-improvement, and accountability. In a sense, organisations that provide public services are configured within an eternal two-year window of public evaluation.

Furthermore, future studies may assess which ToC features citizens find most/least useful when making choices in relation to public services. In other words, what ToC features might be installed

[4]Nhs.uk. As noted previously, this site appeared in both the 'UK' and the 'Health' categories on Alexa, so it was counted twice.

[5]Tfl.gov.uk.

into government websites to better facilitate users to evaluate government services (see Ziewitz, 2012)? How, and to what extent, can market-oriented features in the 'Produsing ToC' modality be installed into a public services context, and what does this mean for governing in a neoliberal context? Moving beyond a focus on the state, future studies may also examine the constellation of non-profit (.org) *health-related* ToC websites, and how these function in relation to social policy and governance more broadly.

7.6 Reflection and conclusion

Given the important role and 'glut' of choice in consumer societies it is perhaps not surprising that ToC is such a widespread phenomenon. The two ToC modalities represent a kind of 'infrastructure of modernity', in a sense, two different kinds of architectural forms that are deployed to construct and govern online spaces in which choice is experienced and exercised. Like all infrastructure, ToC both shape and are shaped by individuals and society. As Winston Churchill said, "we shape our buildings and afterwards our buildings shape us" (Churchill, 1943)[6]. The design and materiality of the spaces that we inhabit shape and govern our conduct without direct force or coercion. Spaces are governed (Henman, 2007; Woolgar & Neyland, 2013, pp. 166-193) and this study argues that this is no less true of *online* spaces. For websites and social media, the inclusion or exclusion of particular features or design elements shapes the affordances of the space. For instance, Kaun et al. (2015) show how the introduction of the 'timeline' feature on Facebook enabled users and administrators to construct a summarised history (e.g., of a profile or a page), which in turn structures the temporal experience of 'remembering' on Facebook.

In this thesis, I have studied how websites shape and govern 'choice' through their design and architectural features, conceptualised as ToC. ToC features, of course, are not limited to the web *per se*, and are prevalent on other online platforms such as mobile and tablet apps (which were not studied in this thesis). Indeed, many of the websites in this study have mobile apps that are deployed alongside the 'flagship' website (e.g., Yelp and Trip Advisor). A key logic of these mobile platforms is that they are easier to navigate and more accessible from anywhere. They form hybrid relations with individuals and becoming a mundane part of everyday existence, in the same way that other

[6]From an address given in October, 1943, regarding the rebuilding of the Commons Chamber after it was destroyed.

technologies have, such as ballpoint pens, automobiles, and televisions. Indeed, the dichotomy of online/offline and the scholarship around 'cyberspace' of the 1990s and early 2000s has shifted into an account of the hybrid, techno-social character of contemporary society, where communications devices are always on and rarely disconnected, and are imbricated in almost every conceivable aspect of existence.

A common theme in popular discourse is that the Internet (and more broadly digital technology) serves to 'manipulate' or 'distort' human freedom and/or decision-making, often in subtle or undetectable ways. This study has avoided such a technologically determinist position. Yet, in a speculative way, ToC are perhaps even more 'insidious' than popular discourse might suggest. In a commercial context, ToC provide a kind of ideal marketing tool. Websites such as Amazon and Yelp constitute the equivalent of modern-day empires, and ToC are a key factor of their success and appeal (what would Amazon be without its rating and review system?). ToC are deployed within these spaces to link up the interests and rationalities of the operators with the interests and self-governing capacities of users. If users are satisfied, they will come back, are more likely to make a transaction, and they will keep 'produsing' content within the space. ToC website users provide free digital labour (e.g., writing reviews and rating content), but may do so because they come to identify with, or aspire towards, the labels, badges, and categories that signify social status and achievement within the website (e.g., "Top #100 reviewer" on Amazon). Websites such as Amazon configure users to be able to gain influence and status for writing reviews and providing ratings, which in turn potentially influences the choices of thousands of other users.

ToC govern choice at the nexus of the interests of individuals and the interests of website operators. But as Bucher (2012) suggests[7], it could be the case that ToC not only algorithmically shape user practices and subjectivity, but also lead users to internalise their norms and priorities. As people use ToC, they might come to identify and relate to themselves as particular kinds of choosers, as particular kinds of subjects. In a sense, this is more insidious than ToC simply 'manipulating' choice, because users may end up 'freely' choosing what the website wants them to. Indeed, self is a project shaped by choice, and ToC provides another technique that individuals have at their disposal to manage their conduct and relate to themselves and others. Choosing is hard. For individuals, ToC features are powerful because

[7]The argument Bucher takes relates more broadly to algorithms in web applications, but here I indulge in the spirit of the argument.

of their affordances for helping to navigate a complex world of choice. Non-linear algorithms, such as recommender systems, mirror back to us our own desire for reflexive individuality, as Iyengar (2011) suggests more broadly: *I choose this, therefore I am that; I am that, therefore I choose this*. We hear about the effects of 'filter bubbles' (Pariser, 2011), whereby web users, through their online behaviour, become increasingly caught up within individualised 'bubbles' that reflect back to them their already-held interests and desires, exposing them to information they are statistically likely to click on and engage with. From a speculative standpoint, this poses another insidious dimension to ToC websites that use collaborative filtering to recommend choice to users. What, really, is 'choice' in the context of sophisticated recommender systems such as Netflix? If I am unsure about what movie to watch (out of many thousands of options), choosing the right movie is as easy as accepting the recommendation, which links up the ideal movie to my individual desires and preferences. This recursive shaping of choice may not be so different from a filter bubble. The logical progression of this is almost absurd: it is not simply me who chooses, but my choices that choose *me*. And yet this appears to be a key trajectory of ToC.

Speculation aside, this thesis has provoked a re-evaluation of the role of web technologies in shaping choice in contemporary society, conceptualised in this study as ToC. Whilst it is inevitably tied to the time and context in which it was conducted, this study has engaged with and connected into longstanding themes and debates relating to truth and knowledge, power, self-hood, freedom, and, more specifically, choice and technology. The conceptual framework and the findings of this study aimed to contribute critical insights into seemingly mundane technologies that presuppose, and potentially produce, both 'choice' and 'choosers'. In turning to choice as a topic of inquiry, this study sits alongside and enhances current work that examines how web-based ratings, reviews, and rankings schemes shape, and are shaped by, individual and social realities. Becoming conscious about the advent of ToC provides opportunities to better understand, critique, and build upon the entangled trajectories of choice and web technology in contemporary society.

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Appendix A

A.1 List of websites in sample for Phase One

Table A.1 shows the list of 34 websites in the study sample for Phase One. Further details are provided in Chapter 3.

Website URL	**Website URL**
myschool.edu.au	kaiserpermanente.org/
comparethemarket.com.au	makeupalley.com
yelp.com	vitals.com
amazon.com	totalbeauty.com
nhs.uk/service-search	clevelandclinic.org
ebay.com	sutterhealth.org
walmart.com	dogfoodadvisor.com
ikea.com	gsmarena.com
bestbuy.com	cnet.com
target.com	theverge.com
homedepot.com	tomshardware.com
bodybuilding.com	autos.yahoo.com/
newegg.com	edmunds.com
sears.com	kbb.com
webmd.com	shopping.yahoo.com
drugs.com	mouthshut.com
reference.medscape.com/	shopping.com

Table A.1: List of websites in the study sample for Phase One

A.2 List of websites in sample for Phase Two

Table A.2 lists the 193 websites in the study sample for Phase One. As discussed in Chapter 3, these 193 sites were selected for further analysis from an overall sample of 500 top-ranking websites. It displays the website URL, the category on Alexa that the site was sampled from, and the supersector it was assigned to. Further details are available in Chapter 3.

Table A.2: List of websites in sample for Phase Two

Website URL	Category on Alexa	Supersector
amazon.com	Global	PG
ebay.com	Global	PG
yelp.com	Global	TL
microsoft.com	Global	PG
apple.com	Global	PG
Craigslist.org	Global	PG
Aliexpress.com	Global	PG
Alibaba.com	Global	PG
Netflix.com	Global	PG
Themeforest.net	Global	PG
Booking.com	Global	TL
Flipkart.com	Global	PG
Fiverr.com	Global	RT
Cnet.com	Global	PG
Stumbleupon.com	Global	ME
Bankofamerica.com	Global	BA
chase.com	Global	BA
zillow.com	Global	RE
indeed.com	Global	EM
walmart.com	Global	PG
tripadvisor.com	Global	TL
hostgator.com	Global	TE
ebay.com.au	Australia	PG
Gumtree.com.au	Australia	PG
Commbank.com.au	Australia	BA
Realestate.com.au	Australia	RE
Westpac.com.au	Australia	BA
Seek.com.au	Australia	EM
Domain.com.au	Australia	RE
Telstra.com.au	Australia	TC

Continued on next page

Table A.2 – continued from previous page

Website URL	Category on Alexa	Supersector
Carsales.com.au	Australia	AP
Tripadvisor.com.au	Australia	TL
Qantas.com.au	Australia	TL
Truelocal.com.au	Australia	TL
Yellowpages.com.au	Australia	TL
Bankwest.com.au	Australia	BA
Urbanspoon.com	Australia	TL
Officeworks.com.au	Australia	PG
Etsy.com	Australia	PG
Optus.com.au	Australia	TC
Bunnings.com.au	Australia	PG
Jetstar.com	Australia	TL
Kogan.com	Australia	PG
Taste.com.au	Australia	FB
Harveynorman.com.au	Australia	PG
Elance.com	Australia	RT
Virginaustralia.com	Australia	TL
Wotif.com	Australia	TL
Jbhifi.com.au	Australia	PG
Bendigobank.com.au	Australia	BA
Odesk.com	Australia	RT
Rightmove.co.uk	UK	RE
Gumtree.com	UK	PG
Hsbc.co.uk	UK	BA
Tripadvisor.co.uk	UK	TL
Bt.com	UK	TC
Argos.co.uk	UK	PG
Tesco.com	UK	PG
Santander.co.uk	UK	BA
Zoopla.co.uk	UK	RE
Lloydsbank.co.uk	UK	BA
Moneysavingexpert.com	UK	FS
Autotrader.co.uk	UK	AP
Virginmedia.com	UK	TC
Johnlewis.com	UK	PG
Asos.com	UK	PG
Tfl.gov.uk	UK	GO
Yell.com	UK	TL
Nationwide.co.uk	UK	BA
Skyscanner.net	UK	TL

Continued on next page

Table A.2 – continued from previous page

Website URL	Category on Alexa	Supersector
nhs.uk	UK	GO
Nationalrail.co.uk	UK	IG
Thetrainline.com	UK	IG
Next.co.uk	UK	PG
Reed.co.uk	UK	EM
Easyjet.com	UK	TL
Marksandspencer.com	UK	PG
Asda.com	UK	PG
ikea.com	UK	PG
Britishairways.com	UK	TL
Diy.com	UK	PG
Barclaycard.co.uk	UK	BA
Debenhams.com	UK	PG
Codecanyon.net	UK	PG
Boots.com	UK	PG
Ee.co.uk	UK	TC
Totaljobs.com	UK	EM
Peopleperhour.com	UK	RT
Sainsburys.co.uk	UK	PG
Webmd.com	Health	HE
Drugs.com	Health	HE
Nhs.uk	Health	GO
Patient.co.uk	Health	HE
kaiserpermanente.org/	Health	HE
Rxlist.com	Health	HE
Zocdoc.com	Health	HE
Makeupalley.com	Health	PG
Cancer.org	Health	HE
Vitals.com	Health	HE
Totalbeauty.com	Health	PG
Petmd.com	Health	HE
Netdoctor.co.uk	Health	HE
Clevelandclinic.org	Health	HE
Paulaschoice.com	Health	HE
Medcohealth.com	Health	PG
Diabetes.org	Health	HE
Ideafit.com	Health	HE
Ewg.org/skindeep/	Health	HE
Wellness.com	Health	HE
Calorieking.com/foods/	Health	HE

Continued on next page

Table A.2 – continued from previous page

Website URL	Category on Alexa	Supersector
Atkins.com	Health	PG
Naturallycurly.com	Health	PG
Sutterhealth.org	Health	HE
Goodrx.com	Health	PG
Earthclinic.com	Health	HE
Bounty.com	Health	PG
Alz.org	Health	PG
Socialanxietysupport.com	Health	HE
booking.com/	Recreation	TL
Tripadvisor.com	Recreation	TL
Expedia.com	Recreation	TL
Hotels.com	Recreation	TL
Kayak.com	Recreation	TL
Priceline.com	Recreation	TL
Agoda.com	Recreation	TL
Southwest.com	Recreation	TL
United.com	Recreation	TL
Zomato.com	Recreation	TL
Delta.com	Recreation	TL
Aa.com	Recreation	TL
Ryanair.com	Recreation	TL
Hilton.com	Recreation	TL
Marriott.com	Recreation	TL
Orbitz.com	Recreation	TL
Vrbo.com	Recreation	TL
Hotwire.com	Recreation	TL
Travelocity.com	Recreation	TL
Homeaway.com	Recreation	TL
Lego.com	Recreation	PG
Lonelyplanet.com	Recreation	TL
Timeout.com	Recreation	TL
Emirates.com	Recreation	TL
Opentable.com	Recreation	FB
Autoblog.com	Recreation	AP
Ana.co.jp	Recreation	TL
Lufthansa.com	Recreation	TL
Turkishairlines.com	Recreation	TL
Lan.com	Recreation	TL
Hostelworld.com	Recreation	TL
Ford.com	Recreation	AP

Continued on next page

Table A.2 – continued from previous page

Website URL	Category on Alexa	Supersector
Hyatt.com	Recreation	TL
Usairways.com	Recreation	TL
Travelzoo.com	Recreation	TL
couchsurfing.org/	Recreation	TL
Venere.com	Recreation	TL
Accorhotels.com	Recreation	TL
Klm.com	Recreation	TL
Saudiairlines.com	Recreation	TL
Virgin-atlantic.com	Recreation	TL
Caranddriver.com	Recreation	AP
Qatarairways.com	Recreation	TL
Virtualtourist.com	Recreation	TL
Airberlin.com	Recreation	TL
Motortrend.com	Recreation	AP
Honda.com	Recreation	AP
Iberia.com	Recreation	TL
Aircanada.com	Recreation	TL
Aeroflot.ru	Recreation	TL
Alaskaair.com	Recreation	TL
Topgear.com	Recreation	AP
Cathaypacific.com	Recreation	TL
Hostelbookers.com	Recreation	TL
Porsche.com	Recreation	AP
Cheaptickets.com	Recreation	TL
Fodors.com	Recreation	TL
Spicejet.com	Recreation	TL
Expedia.ca	Recreation	TL
Onetravel.com	Recreation	TL
Wine-searcher.com	Recreation	FB
Foodandwine.com	Recreation	FB
Carnival.com	Recreation	TL
Hrs.de	Recreation	TL
Laterooms.com	Recreation	TL
Alitalia.com	Recreation	TL
Volvocars.com	Recreation	AP
Bestwestern.com	Recreation	TL
Bmwusa.com	Recreation	AP
Cheapflights.co.uk	Recreation	TL
Zagat.com	Recreation	FB
Chevrolet.com	Recreation	AP

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Table A.2 – continued from previous page

Website URL	Category on Alexa	Supersector
Royalcaribbean.com	Recreation	TL
Travel.yahoo.com	Recreation	TL
Flyfrontier.com	Recreation	TL

A.3 Supersector codes

Table A.3 shows the list of supersector categories and the codes used to represent them. Further details are available in Chapter 3.

Supersector	**Code**
Automobiles & Parts	AP
Banks	BA
Basic Resources	BR
Chemicals	CH
Construction & Materials	CM
Education	ED
Financial Services	FS
Food & Beverage	FB
Health Care	HE
Industrial Goods & Services	IG
Insurance	IN
Media	ME
Oil & Gas	OG
Personal & Household Goods	PG
Retail	RT
Social Care	SO
Technology	TE
Telecommunications	TC
Travel & Leisure	TL
Utilities	UT
Employment	EM
Real Estate	RE

Table A.3: List of supersector categories and codes

Appendix B

B.1 MCA on the Facilitating Choice dimension

For MCA, the ‘active variables’ are the 25 variables in the ‘Facilitating Choice’ dimension, and the ’active individuals’ are the 183 unique ToC websites drawn from the study sample. Three ’supplementary variables’ (also known as ‘illustrative’ variables) are also included in analysis: website category, ’GTLD’, and ‘Supersector’. As Le Roux and Rouanet argue, supplementary variables considerably enrich the interpretation of data (2010, pp. 58-60). As specified in Chapter 3, supplementary variables enable an analysis and interpretation of the patterns in the data in respect to important attributes of the individuals (in this case ToC websites) and the variables (the 25 variables in ‘Facilitating Choice’). Note: as described in Abdi and Valentin (2007), whilst the supplementary variables are computed, they do not influence the output because these variables are excluded from the eigenvalues (and therefore the loadings on the resulting principal axes).

MCA generated 25 principal axes for the ‘Facilitating Choice’ dataset. As described in Chapter 3, the first problem is to decide how many axes or ‘components’ to retain. Following the methodology outlined in Chapter 3, the issue of ‘component retention’ is addressed using Cattell’s scree test. In this way, the eigenvalues are visualised in a scree plot (Figure B.1) in descending order (on the y-axis) and we examine the inflection point (or ‘elbow’) in the curve, retaining all the axes greater than this point. Figure B.1 shows that the inflection point occurs at Axis 5, so on the basis of Cattell’s scree test it is argued that the first four axes are retained. The sum of variance of the first three axes accounts for nearly half of all variance in the ‘Facilitating Choice’ dataset (48%), which in this study is regarded as a good approximation of the data.

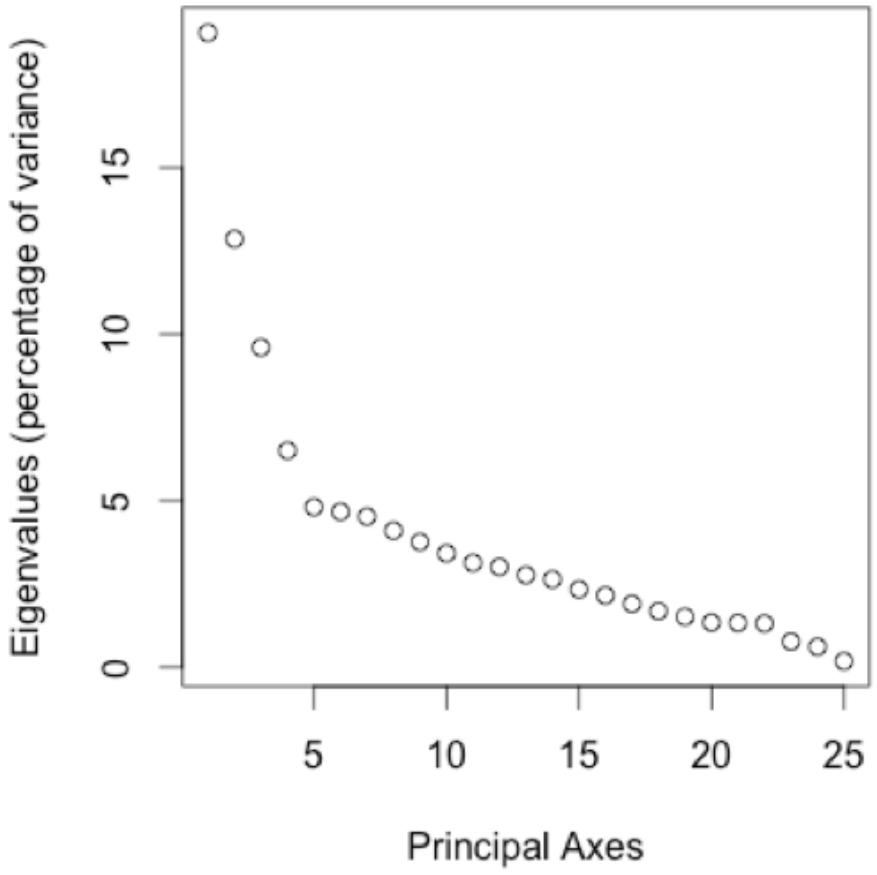

Figure B.1: Eigenvalues (percentage of variance) for MCA of 'Facilitating Choice' dataset

Table B.1: Complete results for MCA - Facilitating Choice data subset

Category	Estimate	P-value
Axis 1 - Facilitating Choice MCA		
BA	0.424	0
Rating_-	0.342	0
Sortable.lists_-	0.318	0
Reviews_-	0.308	0
Filter.by.features_-	0.301	0
Customer.recommendation_-	0.283	0
Best.selling...popular_-	0.261	0
Personalised.options_+	0.259	0
Featured_-	0.258	0

Continued on next page

Table B.1 – continued from previous page

Category	Estimate	P-value
Health	0.25	0
Suggestive.search_-	0.243	0
ORG	0.24	0.003
Similar.items_-	0.233	0
Standard.search_+	0.227	0
Personalised.recommendations_-	0.218	0
Search.by.category_-	0.212	0
Price_-	0.208	0
Relevance_-	0.175	0
HE	0.167	0
Search.by.location_-	0.161	0
Customer.Q.A_-	0.155	0.006
Deals...specials_-	0.143	0
Location_-	0.136	0
Recency_-	0.128	0
Transacting.choice_-	0.127	0.001
Side.by.side_+	0.124	0
Live.chat.service_+	0.108	0.019
AP	0.055	0.037
Live.chat.service_-	-0.108	0.019
Side.by.side_-	-0.124	0
Transacting.choice_+	-0.127	0.001
Recency_+	-0.128	0
Location_+	-0.136	0
Deals...specials_+	-0.143	0
Customer.Q.A_+	-0.155	0.006
Search.by.location_+	-0.161	0
Relevance_+	-0.175	0
Recreation	-0.185	0
COM	-0.205	0.006
Price_+	-0.208	0
Search.by.category_+	-0.212	0
Personalised.recommendations_+	-0.218	0
Standard.search_-	-0.227	0
Similar.items_+	-0.233	0
Suggestive.search_+	-0.243	0
Featured_+	-0.258	0
Personalised.options_-	-0.259	0
Best.selling...popular_+	-0.261	0
Customer.recommendation_+	-0.283	0

Continued on next page

Table B.1 – continued from previous page

Category	Estimate	P-value
Filter.by.features_+	-0.301	0
Reviews_+	-0.308	0
Sortable.lists_+	-0.318	0
TL	-0.32	0
PG	-0.326	0.008
Rating_+	-0.342	0
Axis 2 - Facilitating Choice MCA		
Search.by.location_-	0.253	0
Location_-	0.235	0
Comments_+	0.231	0
Customer.Q.A_+	0.217	0
Recency_+	0.215	0
PG	0.207	0
Global	0.203	0
Relevance_+	0.193	0
Suggestive.search_-	0.189	0
Standard.search_+	0.185	0
Personalised.recommendations_+	0.179	0
Search.by.category_-	0.151	0
AP	0.142	0.014
Best.selling...popular_+	0.121	0
Rating_+	0.111	0
Customer.recommendation_+	0.097	0.007
Reviews_+	0.095	0.001
Side.by.side_-	0.093	0.001
Personalised.options_+	0.093	0.003
Health	0.09	0.01
Filter.by.features_+	0.086	0.019
Deals...specials_-	0.076	0.004
Transacting.choice_-	0.075	0.02
Featured_+	0.059	0.043
HE	0.055	0.047
Featured_-	-0.059	0.043
Transacting.choice_+	-0.075	0.02
Deals...specials_+	-0.076	0.004
Filter.by.features_-	-0.086	0.019
Personalised.options_-	-0.093	0.003
Side.by.side_+	-0.093	0.001
Reviews_-	-0.095	0.001

Continued on next page

Table B.1 – continued from previous page

Category	Estimate	P-value
Customer.recommendation_-	-0.097	0.007
Rating_-	-0.111	0
Best.selling...popular_-	-0.121	0
Search.by.category_+	-0.151	0
Personalised.recommendations_-	-0.179	0
Standard.search_-	-0.185	0
Suggestive.search_+	-0.189	0
Relevance_-	-0.193	0
Recency_-	-0.215	0
Customer.Q.A_-	-0.217	0
Comments_-	-0.231	0
Location_+	-0.235	0
Search.by.location_+	-0.253	0
Recreation	-0.287	0
TL	-0.31	0
Axis 3 - Facilitating Choice MCA		
GOV	0.403	0.008
Transacting.choice_-	0.258	0
HE	0.254	0
Number.of.reviews_+	0.229	0
Deals...specials_-	0.22	0
Price_-	0.214	0
Health	0.185	0
Comments_+	0.163	0
Live.chat.service_-	0.149	0
Side.by.side_-	0.143	0
Location_+	0.096	0
Customer.recommendation_-	0.095	0.002
Featured_-	0.093	0
Best.selling...popular_-	0.088	0
Search.by.location_+	0.074	0.001
Search.by.category_+	0.067	0.003
Reviews_+	0.062	0.009
Relevance_+	0.057	0.025
Rating_+	0.056	0.025
ORG	0.035	0.041
Rating_-	-0.056	0.025
Relevance_-	-0.057	0.025
Reviews_-	-0.062	0.009

Continued on next page

Table B.1 – continued from previous page

Category	Estimate	P-value
Search.by.category_-	-0.067	0.003
Search.by.location_-	-0.074	0.001
Best.selling...popular_+	-0.088	0
Featured_+	-0.093	0
Customer.recommendation_+	-0.095	0.002
Location_-	-0.096	0
PG	-0.11	0.007
UK	-0.117	0.032
Side.by.side_+	-0.143	0
Live.chat.service_+	-0.149	0
Comments_-	-0.163	0
COM	-0.188	0.013
Price_+	-0.214	0
Deals...specials_+	-0.22	0
Number.of.reviews_-	-0.229	0
Transacting.choice_+	-0.258	0
Axis 4 - Facilitating Choice MCA		
BA	0.258	0
Number.of.reviews_+	0.183	0
Standard.search_-	0.141	0
Suggestive.search_+	0.135	0
Price_-	0.119	0
Comments_-	0.112	0
Global	0.111	0.003
Customer.Q.A_+	0.109	0.001
Customer.recommendation_+	0.098	0
Personalised.recommendations_+	0.093	0
Live.chat.service_+	0.09	0.001
Sortable.lists_-	0.089	0
Location_-	0.08	0
Featured_-	0.074	0
Search.by.location_-	0.065	0.001
Transacting.choice_+	0.057	0.013
Rating_-	0.048	0.02
Relevance_+	0.046	0.027
Reviews_-	0.043	0.029
Deals...specials_-	0.041	0.032
Deals...specials_+	-0.041	0.032
Reviews_+	-0.043	0.029

Continued on next page

Table B.1 – continued from previous page

Category	Estimate	P-value
Relevance_-	-0.046	0.027
Rating_+	-0.048	0.02
Transacting.choice_-	-0.057	0.013
Search.by.location_+	-0.065	0.001
TL	-0.065	0.026
Featured_+	-0.074	0
Location_+	-0.08	0
Sortable.lists_+	-0.089	0
Live.chat.service_-	-0.09	0.001
Personalised.recommendations_-	-0.093	0
Customer.recommendation_-	-0.098	0
Customer.Q.A_-	-0.109	0.001
Comments_+	-0.112	0
Price_+	-0.119	0
Suggestive.search_-	-0.135	0
Standard.search_+	-0.141	0
Recreation	-0.157	0
Number.of.reviews_-	-0.183	0
AP	-0.229	0.001

B.2 MCA on the Knowledge Production dimension

MCA generated 21 principal axes for the 'Knowledge Production' dataset. Following the method established in Chapter 3 (Section 3.2.2), the issue of 'component retention' is addressed using Cattell's scree test. In this way, the eigenvalues are plotted in descending order (y-axis) and we look for the inflection point (or 'elbow') in the graph, retaining all the axes that are greater than this point. Figure B.2 shows that the general inflection point in the slope occurs at axis 4, with eigenvalues thereby decreasing by small margins. Therefore, it is argued that the first 3 axes are retained. The first 3 axes account for 40.6% of variance in the 'Knowledge Production' MCA dataset, which is sufficient for the requirements of this study.

Note: after initially running MCA it is evident that there was a problem with infrequent categories in the MCA for the 'Knowledge Production' variables, and that these categories were "overly influential for the determination of axes" (Le Roux Rouanet, 2010, p. 62). Therefore, to preserve the constitutive properties of MCA, a 'ventilation' factor of 0.05 was used in order to exclude categories that occur in less than 5% of active variables. In line with MCA in the previous section, three 'supplementary variables' were also included in analysis: website category, 'GTLD', and 'Supersector'.

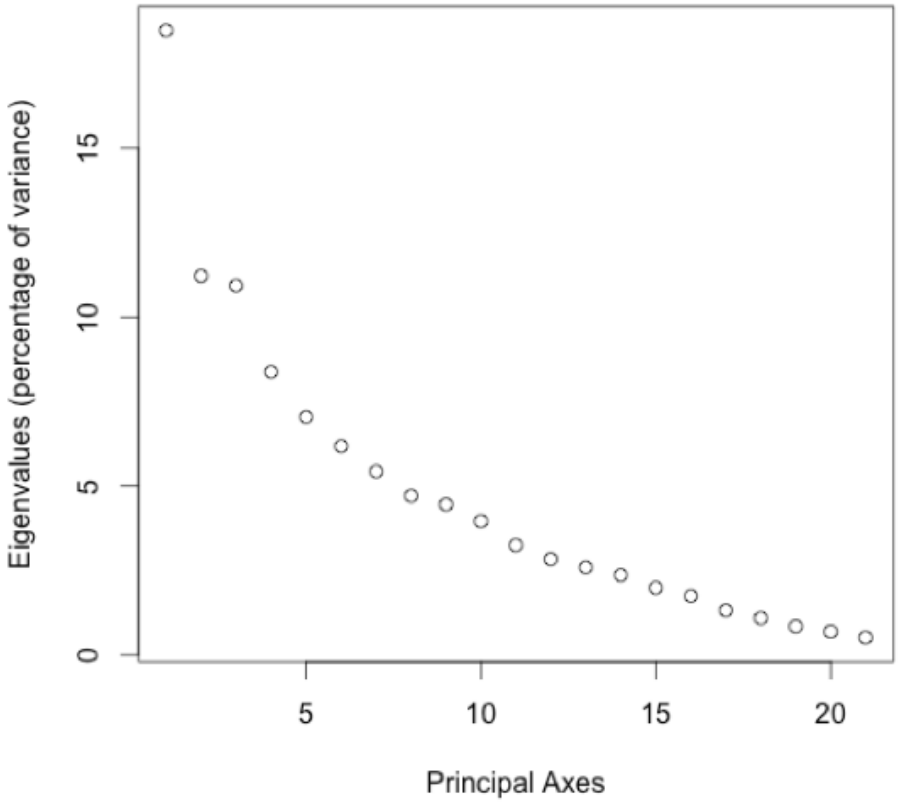

Figure B.2: Eigenvalues (percentage of variance) for MCA of 'Knowledge Production' dataset

Table B.2: Complete results for MCA - Knowledge Production data subset

Category	Estimate	P-value
Axis 1 - Knowledge Production MCA		
Images_NONE	-0.698	0
Reviews.1_NONE	-0.67	0
Ratings...nominal_NONE	-0.615	0
Continued on next page		

Table B.2 – continued from previous page

Category	Estimate	P-value
Statistics..vis.a.vis.population._WEBSITE	-0.594	0
BA	-0.532	0
Textual.description_WEBSITE	-0.408	0
Ratings.Diff.Char.or.Features_NONE	-0.374	0
Statistics..vis.a.vis.population._AUTH	-0.351	0.026
-	-0.336	0
Images_WEBSITE	-0.318	0
Videos_WEBSITE	-0.312	0.031
Ratings...binary_NONE	-0.232	0.043
Ratings...unary_NONE	-0.23	0
UK	-0.195	0.025
Comments.1_NONE	-0.145	0.021
Comments.1_USER	0.145	0.021
Ratings...unary_USER	0.23	0
Ratings...binary_USER	0.232	0.043
Global	0.273	0.023
Reviews.1_USER/WEBSITE	0.283	0.036
Textual.description_USER	0.287	0
TL	0.307	0.003
+	0.336	0
Ratings.Diff.Char.or.Features_USER	0.374	0
Reviews.1_USER	0.387	0
Ratings...nominal_USER	0.436	0
Images_USER	0.453	0
Videos_USER/WEBSITE	0.478	0
Textual.description_USER/WEBSITE	0.535	0
Images_USER/WEBSITE	0.564	0
Statistics..vis.a.vis.population._USER	0.638	0
Axis 2 - Knowledge Production MCA		
Textual.description_USER	-0.764	0
Images_USER	-0.738	0
Statistics..vis.a.vis.population._USER/WEBSITE	-0.524	0
Statistics..vis.a.vis.population._USER	-0.353	0
Videos_NONE	-0.312	0
Ratings...nominal_NONE	-0.243	0.018
Comments.1_NONE	-0.207	0
Australia	-0.174	0.006
UK	-0.152	0.003
Ratings.Diff.Char.or.Features_NONE	-0.076	0.033

Continued on next page

Table B.2 – continued from previous page

Category	Estimate	P-value
Images_NONE	-0.034	0.037
Videos_WEBSITE	-0.02	0.003
Ratings.Diff.Char.or.Features_USER	0.076	0.033
Textual.description_WEBSITE	0.086	0.002
Comments.1_USER	0.207	0
Reviews.1_USER/WEBSITE	0.23	0.006
Recreation	0.238	0
Statistics..vis.a.vis.population._NONE	0.244	0
Images_WEBSITE	0.303	0
Videos_USER/WEBSITE	0.332	0
Ratings...nominal_USER/WEBSITE	0.412	0
Statistics..vis.a.vis.population._AUTH	0.419	0.02
Textual.description_USER/WEBSITE	0.429	0
Images_USER/WEBSITE	0.469	0
Axis 3 - Knowledge Production MCA		
Textual.description_WEBSITE/AUTH	0.964	0
Statistics..vis.a.vis.population._AUTH	0.802	0
Reviews.1_USER/WEBSITE	0.522	0
HE	0.419	0
Health	0.388	0
Videos_WEBSITE	0.318	0
Comments.1_USER	0.316	0
Ratings...binary_USER	0.241	0.006
+	0.179	0
Images_WEBSITE	0.178	0
Global	0.151	0.012
Ratings.Diff.Char.or.Features_NONE	0.13	0
Ratings...unary_USER	0.111	0.005
Statistics..vis.a.vis.population._USER	0.032	0
PG	0.014	0.042
Ratings...unary_NONE	-0.111	0.005
Ratings..Diff.Char.or.Features_USER	-0.13	0
Images_USER/WEBSITE	-0.135	0.001
-	-0.179	0
Ratings...binary_NONE	-0.241	0.006
Images_NONE	-0.242	0.001
Videos_NONE	-0.275	0
Reviews.1_USER	-0.292	0.004
Recreation	-0.299	0

Continued on next page

Table B.2 – continued from previous page

Category	Estimate	P-value
Comments.1_NONE	-0.316	0
TL	-0.322	0
Statistics..vis.a.vis.population._NONE	-0.517	0
Textual.description_USER/WEBSITE	-0.52	0

B.3 MCA on the Configuring Users dimension

MCA generated 8 principal axes for the 'Configuring Users' dataset. In accordance with the MCA conducted previously in this chapter, Cattell's scree test was used to select how many axes or 'components' to retain for further analysis. Axis 1 accounts for approximately 42% of all variance in the data, with the remaining axes each accounting for considerably less variance. Figure B.3 shows that the inflection point in the scree plot of eigenvalues occurs at Axis 2. On this basis it could be argued that only the first axis is retained. However, given that the aim in this section is not to compress the information, but rather explore patterns within the data, a decision is made to include Axis 2 in the analyses. Therefore, approximately 55% of the variance is explained and a two-dimensional biplot can be used to aid visual interpretation of the data.

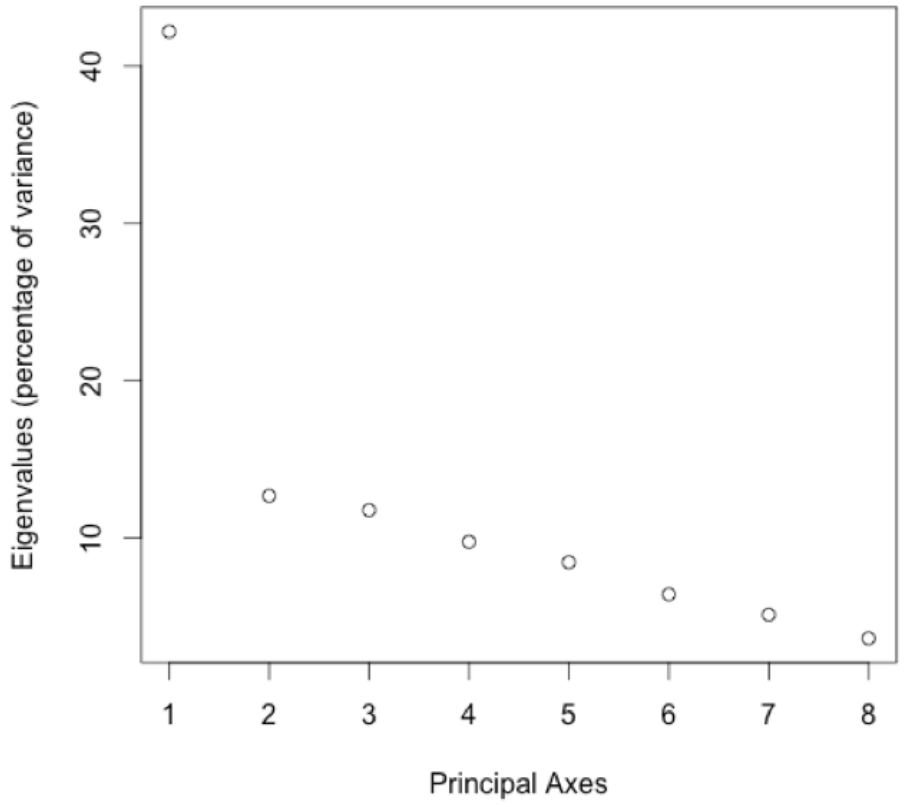

Figure B.3: Eigenvalues (percentage of variance) for MCA of 'Configuring Users' dataset

Table B.3: Complete results for MCA - Configuring Users data subset

Category	Estimate	P-value
Axis 1 - Configuring Users MCA		
Profile.details.publicly.visible_-	-0.56535809	2.51e-51
User.to.user.direct.communication_-	-0.560008664	4.5e-43
User.to.user.evaluation_-	-0.531842007	1.03e-39
BA	-0.512647506	0.000412572
Users.can.share.content.via.social.media_-	-0.452437659	1.05e-25
User.accounts_-	-0.436463172	1.7e-06
Log.in.via.social.media.profile_-	-0.392753157	3.66e-17
Badges.levels.achievements_-	-0.385966027	2.32e-16
User.account.verification_-	-0.320120657	2.12e-09
User.account.verification_+	0.320120657	2.12e-09
Badges.levels.achievements_+	0.385966027	2.32e-16
Global	0.388259187	0.000497402

Continued on next page

Table B.3 – continued from previous page

Category	Estimate	P-value
Log.in.via.social.media.profile_+	0.392753157	3.66e-17
PG	0.400834034	0.000446302
User.accounts_+	0.436463172	1.7e-06
Users.can.share.content.via.social.media_+	0.452437659	1.05e-25
User.to.user.evaluation_+	0.531842007	1.03e-39
User.to.user.direct.communication_+	0.560008664	4.5e-43
Profile.details.publicly.visible_+	0.56535809	2.51e-51
Axis 2 - Configuring Users MCA		
User.accounts_+	-0.538833941	2.69e-38
TL	-0.280185779	1.99e-09
User.account.verification_+	-0.170892118	6.06e-09
Users.can.share.content.via.social.media_-	-0.125958047	2.02e-06
Recreation	-0.107592296	0.009669459
User.to.user.direct.communication_-	-0.082996297	0.003047739
Log.in.via.social.media.profile_+	-0.066738494	0.01671818
Log.in.via.social.media.profile_-	0.066738494	0.01671818
HE	0.074779723	0.006673701
User.to.user.direct.communication_+	0.082996297	0.003047739
Users.can.share.content.via.social.media_+	0.125958047	2.02e-06
Health	0.132906734	0.012647228
User.account.verification_-	0.170892118	6.06e-09
AP	0.410520958	1.11e-09
User.accounts_-	0.538833941	2.69e-38

B.4 MCA on the emblematic dataset

MCA generated 41 principal axes from the emblematic dataset. Cattell's scree test was used to select how many axes to retain for further analysis. This process involves visualising the calculated eigenvalues in a scree plot in descending order (on the y-axis) and examining the inflection point (or 'elbow') in the curve, retaining all the axes greater than this point.Figure B.4 shows that the inflection point in the scree plot of eigenvalues occurs around Axis 7. However, after Axis 4 there are relatively small decreases in cumulative percentage of variance and it is therefore argued that the

first four axes are retained for further analysis and interpretation. Axis 1 through Axis 4 account for 38.1% of all variance.

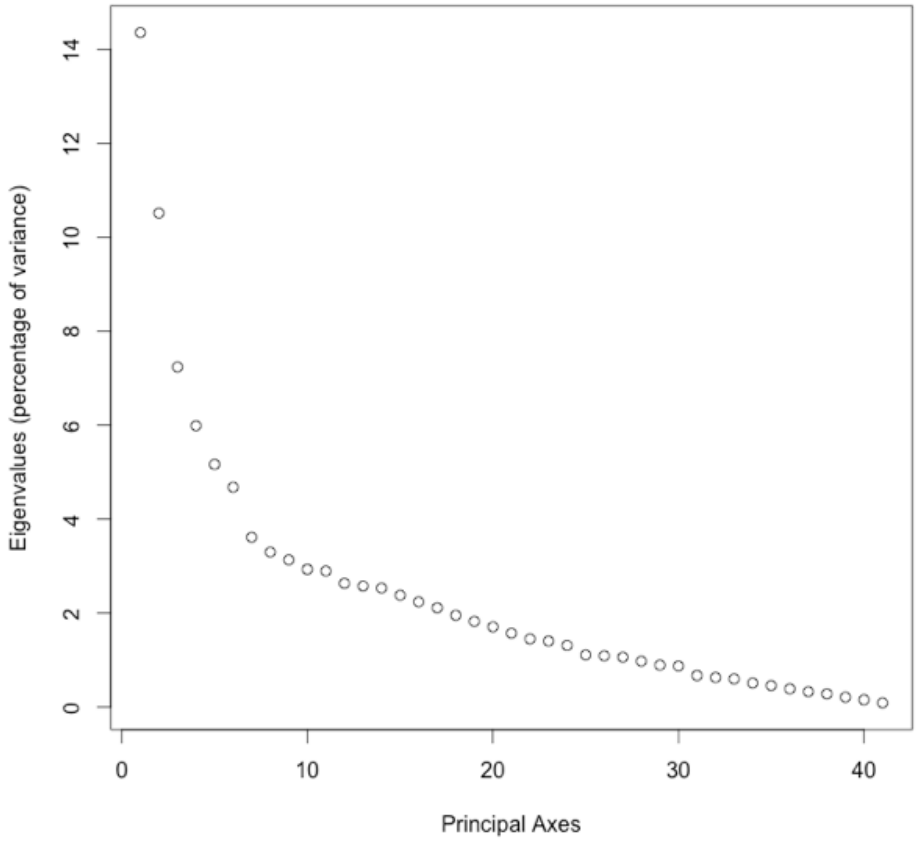

Figure B.4: Eigenvalues (percentage of variance) for MCA of ’emblematic’ dataset

Table B.4: Complete results for MCA - Emblematic dataset

Category	Estimate	P-value
Axis 1 - Emblematic MCA		
Statistics..vis.a.vis.population._WEBSITE	-0.614	0
Textual.description_NONE	-0.609	0.004
Images_NONE	-0.597	0
Statistics..vis.a.vis.population._AUTH	-0.499	0.007
BA	-0.469	0
Rating_-	-0.422	0
Ratings...nominal_NONE	-0.421	0
Reviews_-	-0.408	0
User.accounts_-	-0.364	0
Continued on next page		

Table B.4 – continued from previous page

Category	Estimate	P-value
User.to.user.evaluation_-	-0.333	0
Number.of.reviews_-	-0.324	0
Brand_-	0.315	0
Profile.details.are.publicly.visible_-	-0.296	0
Filter.by.features_-	-0.296	0
User.to.user.direct.communication_-	-0.28	0
Sortable.lists_-	-0.277	0
Customer.Q.A_-	-0.273	0
Customer.recommendation_-	-0.271	0
Global_+	0.263	0
Images_WEBSITE	-0.2	0
Recency_-	-0.18	0
Suggestive.search_-	-0.152	0
Standard.search_+	-0.136	0
Textual.description_WEBSITE	-0.121	0
Price_-	-0.119	0.005
Location_-	-0.102	0.004
Location_+	0.102	0.004
Price_+	0.119	0.005
Standard.search_-	0.136	0
Suggestive.search_+	0.152	0
Recency_+	0.18	0
Videos_USER/WEBSITE	0.206	0
Global	0.247	0.009
Global_-	-0.263	0
Customer.recommendation_+	0.271	0
Customer.Q.A_+	0.273	0
Sortable.lists_+	0.277	0
User.to.user.direct.communication_+	0.28	0
Filter.by.features_+	0.296	0
Profile.details.are.publicly.visible_+	0.296	0
Brand_+	-0.315	0
Number.of.reviews_+	0.324	0
User.to.user.evaluation_+	0.333	0
Images_USER/WEBSITE	0.356	0
User.accounts_+	0.364	0
Reviews_+	0.408	0
Rating_+	0.422	0
Textual.description_USER/WEBSITE	0.432	0
PG	0.432	0.003

Continued on next page

Table B.4 – continued from previous page

Category	Estimate	P-value
Statistics..vis.a.vis.population._USER	0.438	0
Images_USER	0.44	0
Textual.description_USER	0.449	0
Ratings...nominal_USER	0.473	0
Videos_USER	0.486	0.001
RT	0.902	0.005
Axis 2 - Emblematic MCA		
Textual.description_WEBSITE/AUTH	0.65	0
Statistics..vis.a.vis.population._AUTH	0.468	0
HE	0.344	0
Health	0.322	0
Search.by.location_-	0.304	0
AP	0.293	0.001
Location_-	0.269	0
Private.goods_+	0.259	0
Comments_+	0.257	0
User.to.user.direct.communication_+	0.235	0
Suggestive.search_-	0.233	0
Standard.search_+	0.228	0
Private.services_-	0.224	0
Images_WEBSITE	0.221	0
Transacting.choice_-	0.199	0
Deals...specials_-	0.191	0
Customer.Q.A_+	0.188	0
Price_-	0.183	0
Profile.details.are.publicly.visible_+	0.175	0
User.to.user.evaluation_+	0.17	0
User.accounts_-	0.161	0.007
Recency_+	0.161	0
PG	0.137	0
Sortable.lists_-	0.134	0
Videos_WEBSITE	0.133	0
Videos_USER/WEBSITE	0.124	0.007
Statistics..vis.a.vis.population._WEBSITE	-0.028	0.006
Images_USER/WEBSITE	-0.114	0
Sortable.lists_+	-0.134	0
Recency_-	-0.161	0
User.accounts_+	-0.161	0.007
User.to.user.evaluation_-	-0.17	0

Continued on next page

Table B.4 – continued from previous page

Category	Estimate	P-value
Profile.details.are.publicly.visible_-	-0.175	0
Price_+	-0.183	0
Customer.Q.A_-	-0.188	0
Deals...specials_+	-0.191	0
Transacting.choice_+	-0.199	0
Standard.search_-	-0.228	0
Private.services_+	-0.224	0
Images_NONE	-0.233	0
Suggestive.search_+	-0.233	0
User.to.user.direct.communication_-	-0.235	0
Comments_-	-0.257	0
Private.goods_-	-0.259	0
Location_+	-0.269	0
Search.by.location_+	-0.304	0
Recreation	-0.349	0
Textual.description_USER/WEBSITE	-0.354	0
Videos_NONE	-0.356	0
Statistics..vis.a.vis.population._NONE	-0.406	0
TL	-0.463	0
Axis 3 - Emblematic MCA		
RE	0.614	0
Statistics..vis.a.vis.population._USER/WEBSITE	0.444	0
EM	0.425	0.001
Images_USER	0.41	0
Statistics..vis.a.vis.population._USER	0.402	0
Textual.description_USER	0.332	0
Number.of.reviews_+	0.3	0
Ratings...nominal_NONE	0.263	0
Public.services_+	0.246	0.004
Geography...jurisdiction_+	0.239	0
Price_-	0.181	0
Textual.description_WEBSITE/AUTH	0.178	0.001
Deals...specials_-	0.177	0
Transacting.choice_-	0.155	0
Private.services_+	0.135	0
Location_+	0.117	0
Rating_-	0.105	0
Search.by.location_+	0.104	0
Private.goods_-	0.099	0

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Table B.4 – continued from previous page

Category	Estimate	P-value
Videos_NONE	0.093	0
Images_NONE	0.086	0.003
Reviews_-	0.079	0.003
Brand_-	0.061	0.029
Statistics..vis.a.vis.population._NONE	0.02	0
Statistics..vis.a.vis.population._WEBSITE	-0.031	0.009
Brand_+	-0.061	0.029
Reviews_+	-0.079	0.003
Private.goods_+	-0.099	0
Search.by.location_-	-0.104	0
Rating_+	-0.105	0
Location_-	-0.117	0
Ratings...nominal_USER/WEBSITE	-0.129	0.001
Videos_WEBSITE	-0.131	0.001
Private.services_-	-0.135	0
Recreation	-0.142	0.001
Transacting.choice_+	-0.155	0
Deals...specials_+	-0.177	0
Price_+	-0.181	0
Images_USER/WEBSITE	-0.232	0.007
Geography...jurisdiction_-	-0.239	0
Public.services_-	-0.246	0.004
Images_WEBSITE	-0.264	0
PG	-0.281	0
Number.of.reviews_-	-0.3	0
Textual.description_WEBSITE	-0.332	0
Videos_USER/WEBSITE	-0.339	0
Textual.description_USER/WEBSITE	-0.346	0
AP	-0.392	0.004
Axis 4 - Emblematic MCA		
GO	0.589	0.009
Statistics..vis.a.vis.population._AUTH	0.507	0
GOV	0.409	0.009
Videos_USER/WEBSITE	0.345	0
HE	0.323	0
Textual.description_WEBSITE/AUTH	0.305	0
Images_USER/WEBSITE	0.282	0
Public.services_+	0.234	0.002
Textual.description_USER/WEBSITE	0.235	0

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Table B.4 – continued from previous page

Category	Estimate	P-value
Health	0.231	0
Comments_+	0.196	0
Transacting.choice_-	0.188	0
Ratings...nominal_USER/WEBSITE	0.153	0
Customer.recommendation_-	0.148	0
Recreation	0.125	0.001
Location_+	0.105	0
Price_-	0.1	0
Deals...specials_-	0.099	0
Brand_-	0.097	0
Recency_-	0.077	0.001
Search.by.location_+	0.076	0.001
User.to.user.evaluation_-	0.071	0.003
Global_+	0.061	0.007
Images_WEBSITE	-0.055	0.003
User.to.user.evaluation_+	-0.071	0.003
Search.by.location_-	-0.076	0.001
Recency_+	-0.077	0.001
Brand_+	-0.097	0
Deals...specials_+	-0.099	0
Price_+	-0.1	0
Global	-0.102	0.043
Location_-	-0.105	0
Customer.recommendation_+	-0.148	0
Statistics..vis.a.vis.population._USER	-0.17	0.001
UK	-0.174	0
Images_USER	-0.186	0
Transacting.choice_+	-0.188	0
Comments_-	-0.196	0
PG	-0.217	0
Public.services_-	-0.234	0.002
Textual.description_USER	-0.241	0.007
Textual.description_WEBSITE	-0.244	0
Statistics..vis.a.vis.population._USER/WEBSITE	-0.266	0.002

B.5 Hierarchical clustering on the emblematic dataset

Table B.5 shows the complete results for hierarchical clustering on the 'emblematic' dataset. Only statistically significant p-values are included (> 0.05). The definitions of the columns are as follows. The 'Variable category' column indicates the variable and category (e.g. *Location (-)* represents the absence of this ToC construct). The 'Cla/Mod' column is interpreted as: of the websites that exhibit this category, what percentage belong to this cluster. The 'Mod/Cla' column represents the percentage of websites in this cluster that have this category. The 'Global %' column represents the percentage of websites in the full dataset that have this category. The 'P-val' column shows 'p-value' significant values for the categories for each cluster. Only categories with p less than 0.05 are shown. The 'V-test' column indicates the extent to which a category is over or under represented within each cluster. A high positive v-test score indicates the category is highly over-represented, while a negative v-test score indicates the category is highly under-represented.

Table B.5: Complete results for Hierarchical Cluster on the 'emblematic' dataset

Variable category	Cla/Mod	Mod/Cla	Global %	P-value	V-test
Cluster 1 - 'Delimited and Objective Choice'					
Reviews (-)	92.424	82.432	36.066	0	11.254
Nominal ratings (NONE)	92.308	81.081	35.519	0	11.071
Rating (-)	94.545	70.27	30.055	0	10.154
User-to-user evaluation (-)	60.684	95.946	63.934	0	7.967
Global (-)	68.831	71.622	42.077	0	6.697
Brand (+)	78.846	55.405	28.415	0	6.65
Profile details publicly visible (-)	58.407	89.189	61.749	0	6.52
Images (NONE)	100	29.73	12.022	0	6.323
User-to-user direct communication (-)	54.839	91.892	67.76	0	6.014
Filter by features (-)	85.714	32.432	15.301	0	5.27
Statistics vis-a-vis population (WEBSITE))	80	37.838	19.126	0	5.243
Textual description (WEBSITE)	57.732	75.676	53.005	0	5.093
Sortable lists (-)	77.778	37.838	19.672	0	5.024
Customer recommendation (-)	47.403	98.649	84.153	0	4.816
User accounts (-)	100	17.568	7.104	0	4.616

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Table B.5 – continued from previous page

Variable category	Cla/Mod	Mod/Cla	Global %	P-val	V-test
Images (WEBSITE)	55.814	64.865	46.995	0	3.97
Suggestive search (-)	58.824	54.054	37.158	0	3.851
Customer Q&A (-)	44.311	100	91.257	0	3.783
Location (-)	54.023	63.514	47.541	0	3.542
Statistics vis-a-vis population (AUTH)	90.909	13.514	6.011	0.001	3.427
Supersector (Banking)	90.909	13.514	6.011	0.001	3.427
Standard search (+)	57.143	48.649	34.426	0.001	3.288
Price (-)	60.465	35.135	23.497	0.003	2.995
GLTD (ORG)	88.889	10.811	4.918	0.004	2.912
Search by location (-)	51.111	62.162	49.18	0.004	2.872
Search by location (+)	30.108	37.838	50.82	0.004	-2.872
Price (+)	34.286	64.865	76.503	0.003	-2.995
Nominal ratings (USER/WEBSITE)	5.882	1.351	9.29	0.001	-3.207
Standard search (-)	31.667	51.351	65.574	0.001	-3.288
Textual description (USER)	16.667	8.108	19.672	0.001	-3.315
Videos (USER/WEBSITE)	0	0	7.104	0.001	-3.329
Images (USER)	11.538	4.054	14.208	0.001	-3.362
Supersector (Travel and Leisure)	24.638	22.973	37.705	0.001	-3.398
Location (+)	28.125	36.486	52.459	0	-3.542
Customer Q&A (+)	0	0	8.743	0	-3.783
Suggestive search (+)	29.565	45.946	62.842	0	-3.851
User accounts (+)	35.882	82.432	92.896	0	-4.616
Customer recommendation (+)	3.448	1.351	15.847	0	-4.816
Sortable lists (+)	31.293	62.162	80.328	0	-5.024
Statistics vis-a-vis population (USER)	0	0	14.754	0	-5.211
Filter by features (+)	32.258	67.568	84.699	0	-5.27
Textual description (USER/WEBSITE)	2.778	1.351	19.672	0	-5.635
User-to-user direct communication (+)	10.169	8.108	32.24	0	-6.014
Profile details publicly visible (+)	11.429	10.811	38.251	0	-6.52
Brand (-)	25.191	44.595	71.585	0	-6.65
Global (+)	19.811	28.378	57.923	0	-6.697
Images (USER/WEBSITE)	2.041	1.351	26.776	0	-7.053
User-to-user evaluation (+)	4.545	4.054	36.066	0	-7.967
Rating (+)	17.188	29.73	69.945	0	-10.154
Nominal ratings (USER)	4.494	5.405	48.634	0	-10.23
Reviews (+)	11.111	17.568	63.934	0	-11.254
Cluster 2 - 'Produsing Choice'					
Reviews (+)	88.889	95.413	63.934	0	11.254
Nominal ratings (USER)	95.506	77.982	48.634	0	10.23

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Table B.5 – continued from previous page

Variable category	Cla/Mod	Mod/Cla	Global %	P-val	V-test
Rating (+)	82.813	97.248	69.945	0	10.154
User-to-user evaluation (+)	95.455	57.798	36.066	0	7.967
Images (USER/WEBSITE)	97.959	44.037	26.776	0	7.053
Global (+)	80.189	77.982	57.923	0	6.697
Brand (-)	74.809	89.908	71.585	0	6.65
Profile details publicly visible (+)	88.571	56.881	38.251	0	6.52
User-to-user direct communication (+)	89.831	48.624	32.24	0	6.014
Textual description (USER/WEBSITE)	97.222	32.11	19.672	0	5.635
Filter by features (+)	67.742	96.33	84.699	0	5.27
Statistics vis-a-vis population (USER)	100	24.771	14.754	0	5.211
Sortable lists (+)	68.707	92.661	80.328	0	5.024
Customer recommendation (+)	96.552	25.688	15.847	0	4.816
User accounts (+)	64.118	100	92.896	0	4.616
Suggestive search (+)	70.435	74.312	62.842	0	3.851
Customer Q&A (+)	100	14.679	8.743	0	3.783
Location (+)	71.875	63.303	52.459	0	3.542
Supersector (Travel and Leisure)	75.362	47.706	37.705	0.001	3.398
Images (USER)	88.462	21.101	14.208	0.001	3.362
Videos (USER/WEBSITE)	100	11.927	7.104	0.001	3.329
Textual description (USER)	83.333	27.523	19.672	0.001	3.315
Standard search (-)	68.333	75.229	65.574	0.001	3.288
Nominal ratings (USER/WEBSITE)	94.118	14.679	9.29	0.001	3.207
Price (+)	65.714	84.404	76.503	0.003	2.995
Search by location (+)	69.892	59.633	50.82	0.004	2.872
Search by location (-)	48.889	40.367	49.18	0.004	-2.872
GLTD (ORG)	11.111	0.917	4.918	0.004	-2.912
Price (-)	39.535	15.596	23.497	0.003	-2.995
Standard search (+)	42.857	24.771	34.426	0.001	-3.288
Statistics vis-a-vis population (AUTH)	9.091	0.917	6.011	0.001	-3.427
Supersector (Banking)	9.091	0.917	6.011	0.001	-3.427
Location (-)	45.977	36.697	47.541	0	-3.542
Customer Q&A (-)	55.689	85.321	91.257	0	-3.783
Suggestive search (-)	41.176	25.688	37.158	0	-3.851
Images (WEBSITE)	44.186	34.862	46.995	0	-3.97
User accounts (-)	0	0	7.104	0	-4.616
Customer recommendation (-)	52.597	74.312	84.153	0	-4.816
Sortable lists (-)	22.222	7.339	19.672	0	-5.024
Textual description (WEBSITE)	42.268	37.615	53.005	0	-5.093

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Table B.5 – continued from previous page

Variable category	Cla/Mod	Mod/Cla	Global %	P-val	V-test
Statistics vis-a-vis population (WEBSITE))	20	6.422	19.126	0	-5.243
Filter by features (-)	14.286	3.67	15.301	0	-5.27
User-to-user direct communication (-)	45.161	51.376	67.76	0	-6.014
Images (NONE)	0	0	12.022	0	-6.323
Profile details publicly visible (-)	41.593	43.119	61.749	0	-6.52
Brand (+)	21.154	10.092	28.415	0	-6.65
Global (-)	31.169	22.018	42.077	0	-6.697
User-to-user evaluation (-)	39.316	42.202	63.934	0	-7.967
Rating (-)	5.455	2.752	30.055	0	-10.154
Nominal ratings (NONE)	7.692	4.587	35.519	0	-11.071
Reviews (-)	7.576	4.587	36.066	0	-11.254